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VOL. XIV.

PART I.—JANUARY TO JUNE, 1845.

Nos. 157 to 162.

NEW SERIES.

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"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society, in Calcutta; it will languish if such communications shall be long intermitted; and will die away if they shall entirely cease."—SIR WM. JONES.

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*Account of the circumstances attending the death of Mahamed  
Bin Cassim.*

Thus, when the two daughters of Dahir, *Purmul Deo* and *Suruj* Deo, who were on the howdah with him, arrived for the service of the Khalif, he saw that they were extremely beautiful, and appropriated them to himself; still, in order to dissipate their shyness and distress, he committed them to the care of the keepers of the Harem, and after a time called one to his bed. Now since the death of their father had sorely afflicted them, she said, "I am not for the Khalif, for Mahamed *Cassim* took me to himself for three nights." The Khalif on hearing this was enraged, and at once wrote an order himself and despatched it, to the intent, that on seeing that order, he, Mahamed Cassim, should cause himself to be enclosed in a raw hide and sent to the presence of the Khalif. This order was received by Mahamed *Bin Cassim* at *Yassur*: sufficient was it that the order was from the potentate, to which there is but obedience; he was sewed up in a raw hide and sent off: on the third day he died; they put his body in a box and took it to the Khalif, who immediately called the two women and said, "See how absolute is my power." They laughed and said, "In the accomplishment of the wish of the Khalif there is no wavering; but in justice and wisdom there is neither foresight or discrimination, seeing the man, who treated us as if he were our father and brother, on our

simple words, longing as we do for revenge, without enquiry into the truth or falsehood, has been destroyed : our wish was retribution for our father's death. *Mahamed Cassim* moreover was deficient in wisdom ; he should according to the order have started on his journey, but have delivered himself from the hide after one day, and have arrived alive : we have undoubtedly told the truth in our evidence, and we resign our lives." The Khalif was ashamed, and ordered them to be tied to the foot of an elephant and dragged through the bazar and burnt.

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*The Khalifs of Bini Oomai and their Deputies.*

After the conquest of Sindh by Bin Cassim, according to what has been related, *Harraf Bin Keiss Bin Rawah Assadi* remained in charge of Alor, and the individuals before mentioned were governors as appointed. After them the people of Hind became rebellious, and from the confines of Dibalpur to the sea, remained in the hands of the Moslem deputies. After a time *Abu Hifaz, Bin Kutibah, Bin Mussilim* arrived from *Hijjaj*, and punished those who had not embraced the true faith : the (Hindoo) deputies being helpless, fled to Khorassan. About that time *Jamin Bin Zeid* also arrived from *Hijjaj*, and on the part of the Khalif *Suliman Amin Bin Abdullah*, openly obtained the government of Sindh ; and in the year 100 H. *Oomur Bin Abdul Aziz, Bin Umeer, Bin Muslim* came to conquer Hind. He took some of those countries, and made some of the tribes of Sindh Mahomedans ; but in the time of the *Khalif Hasham*, they seceded. *Suliman Bin Hashan*, as is related in the first vol., fled from the army of *Mirwan* and came to Sindh, where, intent on rebellion, he remained until *Saffah* obtained the Khalifat ; he then embraced the service of *Saffah* : also *Abul Khitab* arrived on the part of *Mirwan*.

The period of the government of the deputies of the Khalifs of *Bini Oomai* extended from the year 93 until 133 H. All

The authority of the Khalifs of *Bini Oomai* over Sindh extends to the year 133 H., for a period of 40 years. this period from the commencement of the 93 H. until the period mentioned, is 40 years. Since the government of the deputies of the Khalifat of the house of *Bini Oomai* was as described, now it is necessary to relate the government of the deputies of *Bini Abbas*. Still there are a few circumstances connected with this period which must be related, and which I shall compress as briefly as may be.



Let it not be concealed, that when the deputies of *Bini Oomai* took *Sindh*, some of the dependencies of the country were yet disobedient to the great authority (of the Khalifs.) In short, *Dihi Rahi*, descended from the *Rahis*, was in the city of *Dahir* a place of renown, and *Bim-hul Rahi* was at *Bhunbur*, which city he had founded.

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*Account of the Deputies of the Khalifs of Bini Abbas.*

When *Saffah*, who was the first Khalif of *Bini Abbas*, came to the throne, in the year 133 H., he sent a force under *Da'ud Bin Alli*, and the government of *Sindh* was taken from the deputies of *Bini Oomai*. After four years *Abu Jaffir Mimsur Abbasi*, ordered and prepared an army for *Sindh* and *Hindoostan* : in the time of *Harun Reshid*, *Moussa* the brother of *Fazil* came from *Mecca* to the governorship of *Sindh*, but, giving away all he obtained, he was dismissed. *Alli Bin Isa*, *Bin Haman* came in his place ; at this time the fort of *Tibm*, an impregnable fortification near *Sahurah* and the city of *Bakar*, and other places in that vicinity, westerly from *Sindh*, were in the hands of *Sheikh Abdul Tihrah*, whose tomb with those of other holy men (martyrs) are still places of pilgrimage to true believers, and on the top of the dome it is written, that he died in the year 171 H. The city of *Bhunbur* having been destroyed, they proceeded elsewhere. At length *Abul Abbas* arrived as governor of *Sindh*, and remained there a long period. In the time of *Mam'on*, some further portions of *Hind* were added to the possessions of their deputies. After him, other individuals were appointed from *Bagdad* to the governorship of *Sindh*, until during the Khalifat of *Abdul Kadir Billah al Abbas*, when *Abmed Assak*, *Bin Ahmukhtidar Allah*, was appointed. In the middle of the month

Ramzan 416 H., Sultan Mahmud Ghazi arrived at *Multan* from *Ghuzni*, and having captured *Ooch*, drove out the deputies of *Abdul Kadir* from the country of *Sindh*. The period of the government of the deputies of the Khalifs of *Bini Abbas*, from the commencement before mentioned is altogether 283 years.

The tribe of *Sumrah* had 200 years previously taken possession of certain portions of *Sindh*, but as they had paid tax and tribute, and had been obedient to the Moslem governors, no mention has been made of them : but after having related the

416 H., 1025 A. D. Mahmud of Ghuzni takes possession of *Sindh*, and terminates the authority of the house of *Abbas* after 283 years.

Tribe of *Sumrah* to be described hereafter.

dynasty of the deputies of Ghuzni, and considered the emperors of Delhi, we will relate the rule of some of the above-mentioned tribe.

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*List of the Deputies of Ghuzni, and narrative of the Emperor of Delhi.*

As before mentioned, *Abdul Rizak* the minister of *Sultan Mahmud* Ghuzni deputies. *Ghazi*, in the year 417 H. having taken Bukkur, arrived at Sewistan and Tattah, and the governors of *Bini Oomai* and *Bini Abbas* had not remained there, except a small portion who had formed connections, and were encumbered with families: they were men of note, and received stipends from the government.

From amongst these were 18 families, the heads of generations.

Distinguished heads of families. Briefly: the *Sukufis*, a family of Cazis originally of *Bakar* and *Alor*, from the descendants of *Mussa Bin Yakub*, *Bin Tahi*, *Bin Mahamed*, *Bin Shiban*, *Bin Ushman Sukufi* who, with the *Cazi Ismail*, *Bin Alli*, *Bin Mussa*, *Bin Tahi* were the first relaters of the conquest of Sindh in Arabia, and their great grand-father *Mussa Bin Yakub*, was confirmed by *Bin Cassim* as Cazi of *Alor* after the conquest of that fort: and the "*Tamims*" and "*Hal Mogheirahs*," (which term became slightly changed to *Hal Tuhim* and *Ibn Soriah*,) and the *Abbasis* and *Sadiks*, *Farukians* and *Ooshmamans*, who up to this present time are to be found in all Sindh; and the *Phonwarans* descended from *Haris* and the tribe of *Mungi*, a branch of the *Tamims*, the family of *Jubiriah*, of whom *Sheikh Tahi* in the account of *Hullani* will be mentioned; and the family of *Bini Assad*, of whom is *Sheikh Mirtah*, will be alluded to at *Futtipur*; the family of *Hal Hutbeh* of whom is *Cazi Bahran*, he also will be referred to at *Futtipur*; the family of *Benwabi Sufian*, of whom are some durveshes of *Rahib*; the family of the tribe of *Bajur*, governor near *Jehanker*, the descendants of *Jaremah Jusari*, of whom is the tribe of *Sapiah*, who are the possessors of *Sewistan*; and the *Jhutts* and *Beloochees* are originally from *Harun Mikrani*, and it will be more convenient to relate the genealogies of the *Beloochees* and *Jhutts* without delay.

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*Origin of the Jhutts and Beloochees.*

*Mahamed Bin Harun Mikrani*, who has been mentioned in the account of the officers of *Mikran*, and who came with *Mahamed Cassim* at the time of the conquest of Sindh as far as *Armanbihah*, where he

died and was buried, is the son of *Mahamed Haban, Bin Abdul Rahim, Bin Hamzeh, Bin Abdul Mathab*. Once, when *Meer Hamzah* (may God approve him) went out to hunt in a country far in the desert, he became alone there, and, according to the favour of the Most High who is always propitious to good and great men, a good genius or fairy appeared to keep him company; by the Divine will he embraced her, and she became hidden from his sight: afterwards she brought forth *Abdul Rahim*.

In short, Mahamed Bin Harun had fifty-two sons by seven wives. Thus, one: *Isa, Mikran, Hijaz, Satak, Bikram, Rustum, and Jillah* from one mother named *Hamira*; *Zumal, Mazid, Radah, Buhlal, Shahbab, Nizam, Julal, Marid*, from one mother named *Hamiri*; *Roe-din, Mussa, Noki, Noh, Munday, Raza-al-din*, from *Miriam*; *Jullal* from *Hashiat*; *Adam, Kumal, Ahmed, Humad, Hamud Said, Masud*, from *Musma*; *Mudi, Shir, Koh, Babund, Kark, Nowar al din, Hus-san, Hasein, Suliman, and Abraham*, from *Fatimah*; *Alim, Alli, Tir-kush, Buhpad, Teghzan, Mubarik, Túrkh, Taliah, Arbi, Shiraz, Taj-al-deen, Takht, Gulistan, and Búrkh* from *Khwah*. When, according to the order of *Hijaj* as related, *Mikran* was cleared, that land with others was appointed into two shares, and one share was given to the descendants of *Jallal al deen*, and they came to *Sowah* and *Kich*,\* and their descendants are to this day scattered in great numbers all over *Sindh*. The tribe of *Lodah* also called *Lulian*, have their origin thus. The illustrious *Suliman* sent familiar spirits in the shape of men to purchase slave girls at *Rúm*. On their return, one of these had connection with one of the women; *Suliman* gave her to him, and a boy was born: afterwards his descendants mixed with the Arabs, and came to *Sindh* at the time of the conquest, or before.

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#### *Account of the origin of the tribe of Sumah.*

The narrative of these people, as is necessary, will be fully told in the course of this history. *Sam*, who is said to have been the son of *Amúr*, the son of *Sham Bin Abal Suhub*, and again the son of *Umar Bin Akrameh Bin Alu Jahul*, or the son of *Akrameh Bin Abul Hisam, Bin Abbu Jihil*: there are, however, various reports, of which the following is the most consistent. That they were de-

\* *Kich Mikran*.

scended from *Jamshid*, whence they took the title of "*Jam*," with which they were distinguished; or else they were from Sam the son of Noh: he had four sons, the first Budha, (his descendants were *Budh*, *Sodah*, *Sittah*, *Akhil*, *Ootah*, *Amiah*, *Hazir*, and in short there were sixteen sons generally known by the title of *Rathur*;) and the second *Sankah*, the third *Hami*, and the fourth *Bhakirat*. This *Bhakirat* had a son called *Dusrut*. Now *Dusrut* had three wives, one named *Kila*, the second *Kuliah*, and the third *Simah*: from *Kila* there were two sons, one named *Ram*, the other *Lukhman*; from *Kuliah* one son *Barat*; and from *Simah* one son *Chutur Kim*. To *Sunkah* the son of *Sam* there were also descendants, and also to *Hami*; they were called *Judur*. *Barat* the son of *Dusrut* had descendants called *Purhur*, *Jansipar*, *Gorijah*, and *Rahih Chatar Khan*; the son of *Dasrat* had descendants, called *Charah*, *Lukhman*; son of *Dasrat* had no children; *Ram* had one son, who had a son called *Tawakus*, who had a son called *Tatal*, who had a son called *Nirkanat*; his son was called *Kin*, (the city of *Kin*\* is so called after him.) The son of *Kin* was entitled *Sambat Rajah*. *Sambat Rajah* had four children: 1, *Sam Bir Kirarah*, also called *Sham*; 2, *Nihrat*; 3, *Dakhan*; and 4, *Madah*. In short, *Sam* the son of *Sambat Rajah*, had a son called *Jadim*. *Jadim* had four sons: first, *Habit* whose descendants are the Sumahs of Sindh; the second *Kajbit*, whose descendants are the *Chughdah*; the third *Buhobut*, his descendants are the tribe of *Bhati*; the fourth *Chira Sumah*, of his descendants is *Rahi Diach*, the governor of *Kurnal*, a fort situated in the land of *Soorteh*: he became a martyr, and the tale of the love and devotion of his wife is well known. *Habit* the son of *Jadim*, the son of *Sam*, the son of *Sambat Rajah*, had a son named *Rubdari*; he had a son called *Mijat*, he had *Nootyah*, he had *Udha*, he had *Udheh*, he had *Lakyah*, and he had *Lakah*. *Lakah* was a sovereign, and married into the *Bhati* tribe: he had four sons. Thus, first, *Udhuh* without children; *Udhuh*, which was his place of abode, is called after him. Second, *Mahir*, who had four sons: 1, *Sitah*; 2, *Waditar Patheria*; 3, *Wirhah*, without children; and 4, *Sand*, also without children. They say that the above-mentioned *Lakah* mar-

\* "*Kin* and *Kashmir*," as they are called in Sindh, on the southern confines of the *Seikh* territories; they formerly belonged to Sindh, but now belong to *Multan* and the *Seikh* government.



ried again in his old age, and had four sons. First, *Oomur*; second, *Jeyur*, (his descendants are *Babrahs*, *Dukemehs*, *Kulah*;) third, *Phul Lakah\**, (the *Philani* are known as his descendants;) fourth, *Munayah*. *Oomur* the son of *Lakah* had a son named *Lakah*; he had a son named *Sumah*, who had two sons, one named *Kakah*, and the other *Jikrah*. *Kakah* became a ruler, (the place called *Kakah* is so called after him;) he had two sons, one *Palli* and the other *Raydin*, from the descendants of *Palli*. *Musruk Sumah* became a governor, and *Raydin* had nine sons. Thus: first, *Sumal*, the *Samijahs* are his descendants; second, *Notyar*, all the *Nouts* are his descendants; third, *Lakah*, his descendants are *Lanjar*, *Mukdoom*, *Sihar*, *Lanjar*, (God's mercy be on him) of whom mention will be made in the account of the Sheikhs, belongs to him; fourth, *Abrah*, whose descendants are *Daod*,<sup>1</sup> *Zahir Nayah* and *Fal Nayah*; fifth, *Nayah*; sixth, *Chamir*; seventh, *Munhayah*; eighth, *Koriah* (the descendants of these three last tribes are the *Mundrah*;) ninth, *Palli* who was a chief and had two sons, first *Oodah*, whose descendants are the *Bariah* *Oodejah* (also called *Gordrah Putrah*,) and second *Saud*, who was the chief of the tribe. *Saud* the son of *Palli* had seven sons: first, *Kakah*, whose descendants are the *Kakejah Putrah*; second, *Jarah*, who had descendants the *Jahiejahs*; third, *Waderah*; fourth \*\*\*; fifth, *Hingarah*, his descendants are *Hodejah*, *Juksia*, *Wurha* and *Hingoja*; sixth, *Dirah*, his descendants are *Dirah Sumah* in *Cutch*; seventh, *Jam Hoti*, who had five sons; first, *Halah*, his descendants are known as the *Halah*; second, *Hingorah*, his descendants are *Bumian*, *Ruhuriah*, *Hingorah*, and they founded the places thus mentioned; third, *Sahi*, his descendants are *Sahir Sumah*; fourth, *Chalidriah*, his descendants are well known as *Nikirah*; fifth, *Jam Hapur*, who had two sons; first *Raojah*, second *Jam Jumur*, who had a son *Kirraha*; he had three sons: first, *Saudh*, whose descendants are *Raoma*, *Lakayat* and *Jekrah*; second, *Sumrah*, who had no children; third, *Lakah Jan*, who had one son *Kalah*, who had a son called *Lekah*; after whose death he had another called *Brekanah*, he took the name of his father. *Lakah Bin Kahah*, the brother of *Nahah*, had twelve sons: thus, first, *Jam Jumur*, from whom are descendants the *Sumahs*, the rulers of *Sindh* residents of *Sanuir*, who will be mentioned

\* "Laka Philani," an heroic Rajpút prince, well known in *Cutch* traditions; the *Jhareejahs* of *Cutch* date their origin from the *Sumahs* of *Sind*, (see *Mrs. Postans's* "Cutch," or the traditions of "Laka Philani.")

in their proper places; second, *Oomur*, who ruled in *Buhriah*, he had no children; third, *Palli*, whose descendants are *Palli Sumah*; fourth, *Kahah*, his descendants are *Sodiari Sumah*; fifth, *Hoteh*, his descendants are *Sahib Sumah*, *Hoteh Sumah*, and *Sekawutteh Sumah*; sixth, *Jeysur* (or *Jeyur*), whose descendants are the *Beyah Purya*; seventh, *Mangur*, without children; eighth, *Abrah*, whose descendants are the tribe of *Abrejahs*; ninth, *Hingorah Konur*; tenth, *Sultan*; eleventh, *Rayidam*; twelfth, *Lakah*. In short, *Hingorah Konur* had three sons: first, *Deysur*; second, *Minayah*; and third, *Miradeyah*. *Deysur* had five sons; *Kah*, *Halah*, *Rukun*, *Hingorah*, and *Jonah*. *Jonah* the son of *Lakah*, above-mentioned, had five sons: first, *Khoreah*; second, *Tajiah*; third, *Abrah*; fourth, *Beloch*; fifth, *Babniah*. The account of the descendants of *Babniah*, who ruled in *Sindh*, will be mentioned in the dynasty of the *Sumahs*.

Let it not be concealed, that according to what has been related, the descendants of *Sumah* are to this day the principal natives of the countries of *Sindh* and *Guzerat*, and *Sindh* was previously cultivated and inhabited by them. Besides this tribe, the *Jhutts* and *Beloochees* and the descendants of others as alluded to, were from the older time inhabitants of that country: others might also be enumerated in addition to these, but since it was not intended in this work to make other than an abbreviated account, and to adhere to a few events which are most interesting, if any one should require further particulars let him look for them (elsewhere.) In short, after the deputies of

*Sultans of Delhi*. *Sultan Mahmūd*, those of *Sultan Masud*, *Sultan Modud*, then of *Sultan Mahdud*, then of *Sultan Kutub Aldin*, then the deputies of *Sultan Aram Shah*, all of whom are mentioned in the 1st and 2nd vols. as connected with *Sindh*, came to that country, and during the time of the *Sultanut*, it was divided into four portions; *Multan*, *Ooch*, and the whole of *Sindh* fell to the government of *Nasir Uldin Sibajah*, and at that period seven *Rajahs* in *Sindh* from

the places which shall be mentioned, paid tribute to *Multan*. First, *Rana Bhansur Satah Rathur*, residing at *Zihrah*, belonging to *Dirpilah*; second, *Rana Sami*, son of *Dimach Kirechek* of the tribe of *Sumah*, belonging to *Turk* in the territories of *Rupah*; third, *Jeysar*, son of *Hijah Machee Solanki*, inhabitant of *Maunktan*; fourth, *Wakijah*, son of *Panun Chunun*, belonging to *Dirah*

Sumahs are the principal inhabitants of *Sindh* and *Guzerat*, (i. e. *Cutch*.)

Seven *Rajahs* pay tribute to *Multan*.

*Siwe*, fifth; *Chunun*, son of *Dehtuk*, of the tribe of *Chund*, inhabitant of *Bukkni*; sixth, *Zeyah*, son of *Durya*, inhabitant of *Julan* (viz. *Hami Kot*); seventh, *Jiswad Dirhan Agrah*, inhabitant of *Min Tukar*, belonging to *Bhanirwah*. In short, when Lahore was taken by the deputies of *Taz-ul-din Yelduz*, the prince *Nasir-ul-din Kibajih* retired to Multan, and at the end of the year 623 H., *Mulk Khan Khilzye* and

his followers took possession of the town of *Sewistan*. Sultan *Itimus* sent his minister *Nizam-ul-Mulk, Mahamed Bin Assad*, to besiege *Ooch*, and he himself proceeded to *Delhi*. *Nizam-ul-Mulk* in the year 625 H., took *Ooch* by negotiation, and proceeded towards *Bukkur*; *Nasir-ul-din* fled and died, Sultan *Shums-ul-din* became master of *Sindh*. *Noor-ul-din Mahamed* in the year 630 H. was governor of *Sindh*; and in 633 Sultan *Itimus* died, and *Massud Shah* was his heir. In the confusion of events, a Moghul army crossed the river of *Sindh* and besieged *Ooch*; but, being defeated by Sultan *Mussud*, fled to *Khorassan*. Sultan *Mussud* sent *Mulk Jullah-ul-din* in the place of *Noor-ul-din* as governor of *Sindh*, and at this time *Masir-ul-din Mahamed*, uncle of *Sultan Massud*, became heir to the throne and crown, and in the year 649

having passed through Lahore, Multan, *Ooch* and the whole of *Sindh*, he gave that country to *Mulk Sunjur* and returned; and in the beginning of the year 663, Sultan *Ghias-ul-din* succeeded to the throne of *Delhi*, and gave the government of Lahore, Multan and *Sindh* to his son *Sultan Mahamed*, and after three years he returned to the service of his father at *Delhi*, and returned again after a year. In the year 683 H., *Sultan Mahamed* was killed by the troops of *Jenghiz Khan*, and his son *Key Kosun* succeeded him. Sultan *Julal-ul-din Khiljy*, in the year 693 H. arrived at Lahore, and gave Multan and *Ooch* in charge to his son *Arkuli Khan*, and *Nusrut Khan* remained to govern *Sindh*. In short, in the year 695 H., *Sultan Hullaw-ul-din* sent his brother *Shah Khan* to drive out *Arkuli Khan*; but *Nusrut Khan*, as formerly, with a force of 10,000 retained possession of Multan, *Ooch*, *Bukkur*, *Sewistan* and *Jattah*. In the beginning of the year 697 H., there was a report of the march of a Moghul force from *Seeistan* to *Sewistan*, and it (*Sewistan*) was captured. *Nusrut Khan* released himself. At the close of the rule of the Sultan

623 H. Mulk Khan Khilzye takes *Sewistan*.

649 H. Sultan *Massud* gives *Sindh* to *Mulk Sunjur*.

663 H. Sultan *Ghias-ul-din* succeeds to the *Delhi* throne.

683 H. *Sultan Mahamed* was killed by the troops of *Jenghiz Khan*, and his son *Key Kosun* succeeded him. *Sultan Julal-ul-din Khiljy*, in the year 693 H. arrived at Lahore, and gave Multan and *Ooch* in charge to his son *Arkuli Khan*, and *Nusrut Khan* remained to govern *Sindh*. In short, in the year 695 H., *Sultan Hullaw-ul-din* sent his brother *Shah Khan* to drive out *Arkuli Khan*; but *Nusrut Khan*, as formerly, with a force of 10,000 retained possession of Multan, *Ooch*, *Bukkur*, *Sewistan* and *Jattah*. In the beginning of the year 697 H., there was a report of the march of a Moghul force from *Seeistan* to *Sewistan*, and it (*Sewistan*) was captured. *Nusrut Khan* released himself. At the close of the rule of the Sultan

*Hillaw-ul-din, Ghazi Mulk* was sent with 10,000 Sowars to Dibalpur to drive out the Moghuls of *Jenghiz Khan*. Multan, Ooch, and Sindh were made over to him as a jahgir, but in the revolution of events *Kosún Khan* usurped the throne from his father. *Ghazi Mulk* taking the army of Multan, Ooch and Sindh, overthrew *Kosún Khan* and took the throne, and he was styled Sultan *Ghias-ul-din*. At this time the

The tribe of Sumrah take possession of Jattah. men of *Sumrah* came forth and took possession of Jattah. Sultan *Ghias-ul-din* sent *Mulk Jaj-ul-din* to

Multan, *Kwoajeh Khatria* to Bukkur, and *Mulk Hale-shir* to Sewistan. After a time when *Mulk Kush-koo-Khan* became rebellious in Multan, *Sultan Mahamed Shah*, the son of Sultan *Ghias-ul-din*, in the year 723 H., came to Multan and subdued him; then having placed confidential servants at Bukkur and Sewistan, he returned.

751 H. *Jaghi Ghul*. In the year 751 H., *Jaghi Ghullam* having arrived *lam* invades Sindh. at Jattah from Gujrat, Kach, and other places, pitched at Jahir on the edge of the river; but being annoyed with fever, he marched from thence and came to *Kandul*, where he recovered, and returned to Jattah; from which he remained and surrounded Jattah on four sides, but he died of the same complaint as above-mentioned.

*Sultan Feiroz Shah* then possessed the throne. *Jaghi* was at Jattah,

and hearing of his death he attacked the men of *Sumrah*, the *Jharijahs* and *Sumahs*, and was defeated. The Sumrahs and Jharijahs defeat Feiroz Shah at Jattah.

The Sultan in the beginning of the month of Safar of the above year, marched from the neighbourhood of Jattah on the river *Sankrah*; he directed a fort to be built. *Ami Nasur* remained there with 1000 horse; he built a city called Nusurpur, and he appointed *Mulk Bihram*, chief magistrate in those districts; he built *Bih-rampore*, and *Mulk Allishir* and *Mulk Jaj Kafuri* were left at Sewistan as governors. He then proceeded to Bukkur. *Mulk Kuknahdin* and *Mulk Abadul Aziz* were appointed Naib and Dewan, with a party of trusty men as guardians of the fort; and *Mulk Kuku-ul-din* had the title conferred on him of *Ikhlas Jani*, and was made governor of all the country of Sindh. The Sultan then returned to Delhi. After this, in the year 773 H. having determined to take Nuggur Kot, he came to

773 H. Sultan Feiroz Shah comes again to Jattah. Jattah; *Jam Kheir-ul-din*, the governor of Jattah, defended himself in the fort, surrounded by water, and

the Sultan by reason of the want of grain and the



abundance of musquitoes, returned to Jattah. *Jam Kheir-ul-din* being promised pardon, proffered his service; he took with him all the *zumeendars* to Delhi, but when they reached Sehwan it was discovered that the *Jam* meditated escape; he was chained and imprisoned. After a time *Jam Junur*, son of *Jam Kheir-ul-din*, was invested with the governorship of Jattah, and in the year 790 H. *Feiroz Shah* died, and

790 H. Death of Feiroz Shah. Sultan *Jughluk Shah* succeeded him; after him, Sultan *Abu Bukur*, then Sultan *Mahamed Shah*, then Sultan *Sikundur Shah*, then Sultan *Nasir-ul-din*, came to the throne of Delhi: he sent *Sazang Khan* to take possession of Dibalpur, Multan and Sindh; and in the year 800 H., *Mirza Pir Mahamed Nezah*, a noble of *Timúrs*, crossed the river of Sindh, and invested the fort of Ooch. *Mulk Alli*, who on the part of *Sazang Khan* was in that place, resisted for a month. *Sazang Khan* sent *Jaj-ul-din Khan* with 4000 men to assist him; he released *Mirza Pir Mahamed*, and defeated *Sazang Khan*: he invested Multan, and after six months *Sazang Khan* became obedient and delivered up Multan. At this time *Sahib Karan* in the year 801 H. descended on Multan: from this period the Sultans of Delhi lost

801 H. The power of the Delhi sovereigns in Sindh decline. dominion in Sindh over the governors in that country, who themselves obtained power.

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### The Tribe of Sumrah.

Some of this tribe ruled in parts of Sindh, as has been mentioned, previous to this. Thus the whole time that their authority extended was 550 years; and therefore, after the descendants of *Jamin*, the last of the deputies of *Bini Abbas*, seeing their power, the narrators of history began to make mention of them; at that time, as will be mentioned, the government of Sindh passed to the *Ghoris* and *Ghuzniris*, and this tribe of itself became powerful, as will be related.

And now the origin of this tribe is not clearly traced; but they were evidently old inhabitants of the country, and they are apparently connected with the descendants of "*Sindh*." In short, according to what has been previously related, when in the year of 720 H. *Ghazi Mulk* collected the army of Sindh

and Multan, and took it to Delhi and subdued *Khosrow Khan*, he succeeded to the throne; and Sultan *Ghias-ul-din, Jughluk Shah* was his

title: whilst he was occupied with affairs in that quarter, the men of *Súmrah* collected from the vicinity of *Jhuri* and placed a man named *Sumrah* in the governor's seat, and, having possessed the country, he espoused the daughter of a zumeendar named *Saud*, who was of power and rank: by her he had a son, named *Bangur Khan*. *Sumrah* died, *Bangur* succeeded him, and his son *Dodah* took possession of the country to *Nusurpur*; he had a son named *Sungar*, a minor, and the government of the country came to *Jaree*, daughter of *Dodah*; and when *Sungar* became of years he succeeded to the governorship, and proceeded towards *Cutch* and subdued the country to the river *Manak*. As he had no children, his wife *Heimus'* brother was appointed governor of the city of *Toor* and *Thurri*. After a short time *Dodah Sumrah*, who was governor in the fort of *Dakah*, collected his tribe from the surrounding country, and extirpated the brother of *Heimus*. At this time *Dodu* and *Phatu*, descendants of *Dodah*, came out with a large force, and gave him the chieftainship; he ruled for some time, and after him *Kheira* took possession of the country; then *Armil* succeeded to it, but being an oppressor, the men of *Sumrah* collected and killed him; this was in the year 752 H.: but the beginning and end of this tribe as rulers is by others otherwise related. Thus in the *Muntukhib al Juwarikh*, when *Sultan Abdul Rashid, Bin Sultan Mahamed Ghazi*, succeeded to the throne, his imbecility caused the inhabitants of *Sindh* to be rebellious, and in the year 445 H. the men

of *Sumrah* collected near *Thurri*, and placed a person named *Sumrah* in the governship. *Sumrah* possessed his elevation for a long period, and had a son *Bangur* by the daughter of a zumeendar named *Saud*, and died. *Bangur Bin Sumrah* ruled for 15 years; in the year 461 H. he died: after him *Dodah Bin Bangur* governed for 24 years, and in the H. 485 he died. After him *Sungar* for 15 years; after him *Hufif* 36 years; after him *Oomur* 40 years; *Dodah* the second 14 years; *Phutto* 33 years; *Kheysurah Dodah* third 14 years; *Jahi* 24 years; *Chami* 18 years; *Bangur* second 15 years; *Hafif* the second 18 years; *Dodah* the fourth 25 years; *Oomur* the second 35 years; *Bangur* third 10 years: after him *Hamir* succeeded to the govern-

445 H. The *Sumrahs* placed *Sumrah* on the musnud.

Descendants of *Sumrah*.

The Sumahs over- ment, but being a tyrant, the tribe of *Sumah* over-  
threw the *Sumrahs*. threw him, which will be mentioned in the course  
of the history of that tribe. *Oomur Sumrah* founded the fort of  
*Oomur Kot*; *Dilu Rahi*, son of *Dilu Rahi* before-mentioned, governor  
of *Dilu*, was a tyrant and given to infamous practices: to his tyranny  
and oppression is ascribed the destruction of Alor.

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*Account of the destruction of the City of Alor.*

It was a custom of that unjust tyrant to take half the property of  
every merchant who arrived from Hind as duty  
and tax, and he seized the wives of the inhabitants.  
A wealthy and influential merchant who had the  
title of *Seif-ul-Mulk*, and a few other princes  
with him dressed as merchants, but who were on pilgrimage to Mecca,  
being ignorant of that villain's proceedings, entered his capital: the  
merchant had with him a beautiful woman named *Budeh-al-Jumal*;  
at that time the river *Mihran* ran close to Alor. Hearing of the  
beauty of *Budeh-al-Jumal*, *Dilu Rahi* became anxious to possess her,  
and wished to arrest the merchant under the pretence of his intending  
to smuggle his goods. The unfortunate merchant for three days tried to  
persuade the tyrant, and vented his complaints mightily to the Most  
High; and as the supplications of the afflicted are accepted, he was  
inspired with a dream, that in the morning he should conceal himself,  
and taking a party of stone-cutters famous as *Firhad*, and having  
bribed them well, during the following night cut a passage through  
the hills for the passage of the river, large enough for a boat, and on  
the other side erect a strong embankment. Although both these ap-  
peared impossible tasks, yet by the help of the Almighty they were  
accomplished. The merchant with his boats passed safely by that road;  
and the river *Mihran*, quitting its former passage, took the course  
which it now takes. In the morning the people told *Dilu Rahi*, but all  
his efforts to repair the calamity were unavailing against the decree of  
fate. The ruin of Alor is dated to have commenced from that day.  
They say that *Seif-ul-Mulk* with his beloved *Budeh-ul-Jumal*, when they  
returned from the pilgrimage to the *Kaabah*, arrived and lived in the  
country between *Derah Ghazi Khan* and *Sitpur* and died. *Budeh-ul-  
Jumal* had two sons, *Jah* and *Chatah*; until now her tomb with those of  
her two sons, are places of pilgrimage.

*Account of the decline of the City of Bhunbur, generally known  
as Brahmanabad.*

They relate, that Dilu Rahi after the ruin of the city of Alor came to the latter place to reside ; he had a brother *Choteh Oomrani* : in his youth he had been blessed with the true belief, so that leaving that city he had studied and learnt the Koran, and performed the duties enjoined by his religion sedulously. When he returned to the city, his relations pressed upon him the acceptance of the governorship, but he would not accept it : some one jokingly observed, “ This Turk has been to the Kaabah, and married the daughter of a certain Arab.” By chance in those his younger days he became anxious to perform the Haj ; and when he arrived there, he one day saw a woman in a shop occupied in repeating the Koran : he staid to listen. She asked him, why he staid ? He said, to hear the Koran. “ If you will teach me to read, I will be your slave.” The woman said, “ My instructor is the daughter of a certain person ; if you will disguise yourself as a woman and come with me, I will take you to her.” In short, in this way he was taken there, and became occupied in reading and meditating on the Koran. It appears, that his instructress was skilled in astrology : one day the woman came to her, and asked after the fortune of *Choteh* in disguise ; she said he would be a governor or chief. *Choteh* said, “ Since you know the fortune of others, can you tell any thing of your own ?” The girl said, “ You are right ; I shall wed with some one who is an inhabitant of Sindh.” They asked her, who it was ? she said to *Choteh*, “ You are the man.” In short, concealment was at an end ; the girl instructed him after this to go and change his garments, and to demand her in marriage as she was destined for him ; she then communicated the case to her parents, and was shortly afterwards married to *Choteh*. He after a time returned to his own country, and took his wife, whose name was *Fatimah*, with him : when he arrived at the city of *Dilu Rahi*, that tyrant had made a practice of seizing newly-married women, and then releasing them. *Choteh* tried to dissuade him from this, but he would not desist, until one day he heard the praises of *Fatimah*. Whilst *Choteh* was from home, *Dilu Rahi* came to see her. *Choteh* suspected his intentions ; coming quickly home, he took his wife and left the city, crying out, “ This city through the wickedness of its



governor will be swallowed up this night; whoever wishes to escape from destruction, has now the opportunity of doing so." Some few believed him. On the first night the city escaped, in consequence of the watchfulness of an old woman at her wheel; on the second, from the working of an oil mill: at length, on the third night, the whole city with its inhabitants was swallowed up and destroyed, and one minaret, as an example and to record the fact, yet remains.\*

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*Account of the men of Sumrah taking possession of Cutch.*

This tribe inhabited the country of Cutch, and the ruler of that province protected and encouraged them. After a time this tribe said, "We are strong and numerous, and we have lived safely under your shadow until we become troublesome: now give us a portion of waste land, so that we may cultivate it and pay tribute." The Rahi of Cutch with kindness gave them broad lands, and taxed them at 500 carts of grass from their crops. The tribe continued to pay the tax, and in a short time became acquainted with the manners and customs of the people and governors; they then determined amongst themselves to acquire possession of the country. Now at the gate of the fort occupied by the governor of Cutch, a brahmin and astrologer was placed, and he permitted all to pass in after he had inquired their business. This tribe had collected their 500 carts of grass, but in the grass of each cart they placed two armed men, and one drove the cart into the city; they say that when the carts came in, the brahmin said "there is the smell of flesh in these carts:" the door-keepers rejected his suspicions, and said, "What can there be in grass?" But some of those present thrust their spears into the grass. They say, that those in the carts wiped the blood of their bodies from the points of the spears, so that they should not be discovered. So the door-keepers accusing the brahmin of falsehood, allowed the carts to pass in, and thus the men took possession of the city, and overthrew the Rahi of Cutch, and became Chiefs of the country; until this time the descendants of the Sumrah are, in various

\* *Brahmanabad* must have been situated in the *Lar*, or delta division of Sindh; its site is not fixed.

ranks, the governors of Cutch.\* In short, when in consequence of *Dilu Rahis's* tyranny, the river *Mihran* flowed past *Sewistan*, and those lands which are now fertile became so; then the land of the men of *Sumrah* became unproductive, and from inflicting brands and the op-

Fall of the tribe of *Sumrahs*.

pressions of the before-mentioned tribe, complaints were sent to the Sultan, *Hilaw-ul-din* at *Delhi*; he sent his deputy and chief of his army *Sular Khan*, who coming upon the men of *Sumrah*, they sent their families in care of the tribe of *Charuns*, which tribe is highly respected by both parties, to *Abrah Abranee Sumah*, the governor of *Cutch*, and prepared to oppose the forces of the Sultan; these latter came upon them like the storm on a vessel—there was a great battle. The son of *Sumrah*, who was the Chief of all the forces of that tribe, was killed; the rest could not hold out in the city of *Joor* and fled to *Cutch*. The Sultan's troops pursued their wives and children to *Cutch*, and every night when they halted they threw a large ditch round the camp to prevent a night attack; and these ditches are still to be seen, and very deep. When they reached *Cutch*, *Abrah Sumah* attacked the *Sumrahs* in conjunction with the Sultan's troops. In short, after the fall of the tribe of *Sumrah* the tribe of *Sumah* became

The *Sumahs* obtain power.

the possessors of those countries, and the city of *Mahamed Joor* was destroyed by the troops of the *Shah*; and the city of *Samwa* was founded, and other new districts cultivated. The country of the city of *Joor*, which is situated near the *gunnah* of *Darah*, being through ill fortune abandoned, they founded another *Jooreh* as shall be mentioned.

### The Dynasty of the *Jams* of *Sumah*.

The origin of this tribe is traced to *Akrumeh Bin Hassan, Bin Abi-List of the Jams of Sumah.* *Jihul* as has been mentioned; but according to what has been related, at the time of the arrival of *Mahamed Bin Cassim*, this tribe had embraced *Islamism*, and the account of it is given by *Meer Massum* in the "*Chach Nameh*." Thus, the descendants of *Akrumeh* about the year 93 H. the whole of this tribe entered the *Mahomedan* faith, and collected together from distant places in this country, and *Akrumeh* at or near

\* The ruins of *Goomtee* in *Cutch* are in the traditions of that country, the scene of the exploit of the *Sumrahs*.

that time was a governor, and he is connected with *Sam Bin Oomur*, *Bin Hassan*, *Bin Abi Luhab*, but I do doubt if this is correct.

They are also said to be descended from *Jam-shid*; hence their title of "*Jam*," and this appears the most probable.

Reason of their taking the title of *Jam*, and their name *Sumah* or *Samah*.

From some great man it is related, that they are descendants of *Sam Bin Noh*, and thus they are styled *Sumah*. God knows.

1. *Jam Oonur Bin Babineh*. When they were released from oppression of the tribe of Sumrah, the men of Sumah, who before were cultivators of gardens, collected and styled him "*Jam*;" they constituted him chief and leader. It was thus in the year 752 H., and in a short time this *Jam* obtained complete power; *Mulk Ruttun* overthrew the remainder of the *Túrks*, who were governors in *Sewis-tan*, and after three years and six months, he died. They relate also, that *Kahah Bin Tamachi* his vakeel, brought *Ferroz* and *Alli Shah* from *Bukkur* to *Birhampur*, where they killed him; and after three days the men of *Oonur* killed *Mulk Ferroz*.

2. *Jam Junur Bin Babineh* succeeded his brother; he crossed over from *Tulhati*, and ravaged and pillaged the towns and villages; he left *Bukkur* in charge of the *Túrks*; after this he became powerful in *Sindh*, until Sultan *Hullaw-ul-din* sent his brother *Alif Khan* to *Multan* and its dependencies; *Mulk Taj Kuffuri* and *Tatar Khan* were sent to *Sindh* to oppose *Jam Junur*; previous to that *Jam Junur* had died: his reign extended for 13 or 14 years. The Shah's army took *Bukkur*, and looked towards *Sehwan*. After *Jam Junur*,

3. *Jam Tamachi Bin Jam Oonur* succeeded to the seat of government; the Sultan's army took him and his family prisoners to *Delhi*. The tribe of *Sumah* went to *Thurri*, and for 15 years, 4. *Jam Babineh Bin Jam Oonur* ruled over them, according to the account of *Meer Massum*. 5. *Jam Kheir-ul-din*, son of *Tamachi*, after the death of his father (according to the order of the Shah) came from *Delhi* to *Sindh*, and took possession. Sultan *Mahamed Shah*, pursuing *Taghi Ghullam* as before mentioned, arrived in the vicinity of *Tattah* and died, and Sultan *Ferroz* succeeded him. He went to *Delhi*; *Jam Kheir-ul-din* pursued him to the territories of *Sin*; after some engagements returned, ruled his subjects justly, and in peace. After *Kheir-ul-din*, his son, 6. *Jam Babineh* second, suc-

6. Jam Babineh  
the second.      ceeded him; Sultan *Ferroz Shah* came over, but returned, and coming again took him prisoner. After a time when he had experienced his services he conferred the government of Sindh upon him, and he ruled for 15 years and died: he founded the city of Samwi; some say it was founded by *Payeh Bin Oomur*, but this is wrong.
7. Jam Tamachi  
the second.      7. *Jam Tamachi* second, his brother, succeeded, and ruled peaceably for 13 years: then his son,
8. Jam Sullah-ul-din.      8. *Jam Sullah-ul-din*, who after settling his own country proceeded to *Cutch*, and returned victorious: after 11 years he died.

In the praise of *Sheikh Himar Jumali* (may God's mercy be towards him) it is written, that *Jam Junur* sent *Jam Tamachi* and his son *Jam Sullah-ul-din* to Delhi, and they being released by the Sheikh above-mentioned from Hind returned to Sindh, and overthrew *Junur*, taking possession of the country; first the father, and then the son ruled: but this differs with the first account of *Meer Mussum*. But God knows.

9. Jam Nizam-ul-din.      In short, after *Sullah-ul-din*, *Jam Nizam-ul-din* succeeded to the government, and released his uncles.

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The Editors at first hesitated to publish this article, fearing that their readers might consider it almost a reprint, or an amplification of the former paper by the same author, "On the early history of Scinde from the 'Chuch Namah,' &c.," as it in fact at first sight appears to be. But Lieut. Postans himself in his introduction has, they conceive, assigned the best reason why it should not, even at the risk of some repetition, remain unpublished, namely, that "the author of the *Toofut ul Kiram* has collected his materials from the best authorities." And this is of more importance than it at first sight appears to be, for it implies that the author, who like our own early chroniclers was living in part of the times of his own history, was like them also near enough to the epochs embraced in it to exercise his discretion in the choice of the matters to be chronicled; and this doubtless founded on research amongst documents, and histories, and men now long passed away and numbered with



the dead. And the known customs of the Oriental writers of history, of publishing their works only after reading them to circles of the learned, would have furnished him with many facts, illustrations and corrections, which oral tradition had brought down, and which the stores of written knowledge then undoubtedly existing at all the courts of the Kalifat probably contained.

Our readers will thus, we hope, agree with them in their judgment that, as an historical reference, this translation is alike curious and useful, and they could not have given it otherwise than by printing it entire.

EDS.

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*Notices and Descriptions of various New or Little Known species of Birds, by ED. BLYTH, Curator of the Asiatic Society's Museum.*

*Nisaëtus alboniger*, nobis. A smaller species than either of those of India, measuring about twenty-one inches and a half in length, wing thirteen inches, and tail nine and a half; tarse three inches: occipital crest three inches and a quarter. Adult black above, with a purple gloss, the large alars embrowned and distantly banded with black; tail black, with a broad light greyish-brown bar, occupying about its third quarter from the base; the longer upper tail-coverts have each two cross-bands of the same; lower parts pure white, with black mesial line on throat, large intense black *drops* on the breast, and the belly, vent, lower tail-coverts, tibial plumes, and short tarsal feathers, are throughout closely barred black and white: beak black; and toes wax-yellow. A younger specimen has the *drops* fewer and smaller on the breast, an admixture of rufous about the head, several unmoulted brown feathers among the wing-coverts, and one unmoulted tail-feather has three narrowish dark bars, with two more at base closer and less defined. A remarkably handsome species, from Malacca.

Of the four Indian species of this genus, *N. alboniger* approaches nearest to *N. cirratus*, (Ray, Shaw,) v. *Falco cristatellus*, Tem.; and I doubt whether either of these becomes wholly black with age, like

the *N. caligatus*, (? Raffles), v. *F. niveus* (!), Tem., v. *nipalensis*, Hodgson\*, &c. a change, too, which would seem to obtain in the *Astur melanoleucos* figured in Dr. A. Smith's 'South African Zoology,' and which converts the *Archibuteo lagopus* into the *Falco Sancti Johannis* of the earlier systematists. A South African species of *Nisaëtus* exists in the "*Aquila coronata*," also figured by Dr. A. Smith, in which, if that naturalist be correct, the progressive change of colouring is from light to dark; but his alleged adult is so like the young of the Indian *N. caligatus* in its first dress, that I suspect the changes will be found analogous in the two species. It may be further remarked that the *Aquila bellicosa*, (Daud.) A. Smith, v. *Falco armiger*, Shaw, pertains to a very distinct and long-winged form, exemplified also by the Indian *Aq. Bonellii*, v. *Nisaëtus grandis* of Hodgson; and in this group, which may be distinguished by the name *Eutolmætus*, the adults only exhibit white under parts: whilst in another aquiline form which may bear the name of *Butaëtus*, exemplified by the *Falco pennatus*, Gm., v. *Spizaëtus milvoides* of Jerdon, the reverse change of colouring obtains, as in the ordinary *Nisaëti*. Indeed, a further approximation to the latter group is shewn by an occasional distinct, though slight, enlargement and elongation of the central occipital feathers, in fine adult examples of *Butaëtus pennatus*.

With respect to *Nisaëtus cirratus*, which is evidently the "Crested Indian Falcon" of Willoughby, I described two specimens in a note to Vol. XII. p. 306; and those I must now consider to be young or imperfectly mature: for the Society has since received a much finer adult from Capt. Robt. Shortrede, shot at Midnapore, having a pendent occipital crest consisting of twelve elongated feathers, the four longest measuring five inches and a half. In other respects, this species is not very strongly characterized apart from *N. caligatus* (apud nos,) but has the belly, flanks, and upper tail-coverts, much darker than usual in the corresponding state of plumage of that species, the head also being darker, and the throat more streaky; the dorsal feathers, however, are decidedly of a different form, being

\* Mr. Hodgson's crested variety of his *N. nipalensis* refers to *N. cirratus*, since called by him *N. pallidus*.—E. B.

much longer and narrower, instead of broad and rounded, a difference which is strongly marked on the lower interscapularies. Size the same. The splendid occipital crest is deep black, each feather tipped with white: upper parts empurpled hair-brown, the interscapularies, scapularies and tertiaries, more or less black, and the secondaries having distant dark bands; fore-neck and breast pure white, with a broad dark mesial streak to each feather; the belly, vent, flanks, and lower tail-coverts, dark brown; and thighs the same, a little freckled with whitish: tarsal feathers whitish, mottled with brown: head and neck fulvescent-brown, with mesial dark streaks; the usual three dark lines on the throat somewhat ill defined: tail as in *N. caligatus*, but less dashed with ashy.

This species seems to be peculiar to the hill districts of India, inhabiting alike the sub-Himalayan region, and the hilly parts of Central and Southern India. Mr. Elliot describes it to "sit on the tops of the highest trees, on the watch for hares, pea-fowl, and jungle-fowl, on which it swoops from its elevated perch. Solitary. Shot in the Rampoor jungle, inland from Nellore, at the foot of the Eastern Ghats." Mr. Jerdon and Lord Arthur Hay have since procured specimens from the same locality. The crest-feathers of this bird are not only longer and more copious than in either of the other species, but are of a more lax texture, so that when elevated they curve and droop backward, instead of remaining up straight. *N. caligatus* alone has invariably but a mere indication of this occipital crest, which is well developed in all the rest.

The other Indian species of *Nisaetus* are *N. pulcher*, *J. A. S.* xii, 305; and *N. Kienerii*, (de Sparre), v. *Spizaetus albogularis*, *J. A. S.* xi, 456.\* The following description was taken from what I conceive to have been an adult male of the former, in fully mature plumage. Length of wing seventeen inches and a half, and of tail thirteen inches. Old crest-feather measuring four inches and three-quarters, and new ones growing, which would apparently have been considerably longer. Plumage very Hawk-like: upper parts hair-brown, the exposed terminal portion of the feathers darker and purple-glossed; wing-coverts banded with white; throat with the usual three *striæ*, and the under parts light brown, transversely rayed with white, the colour darkening towards the white, and upon the tibial plumes. Received from Cherra-

\* The latter has since been received from Darjeeling.

Poonjee; and forwarded by the late lamented Dr. Griffith to the Museum of the Honorable Company.

Of the *Spizæetus rufitinctus*, McClelland and Horsfield, *Proc. Zool. Soc.* 1839, p. 153, Mr. Strickland informs me, that "Dr. Horsfield now classes this as a *Limnaëtus*, and it seems only to differ in having the lower half of the tarsus bare and scutate. The beak has a lateral undulation. Wing ten inches and a quarter, and tail eight inches. Fourth and fifth quills equal and longest. The breast is barred brown and white, the bars and their intervals being each about a quarter of an inch wide, and on the thighs about an eighth of an inch wide. The feathers of the breast have two brown bars on each. Tail with four light and four darker brown bars." As this is one of the very few Indian *Raptores* still wanting to the Society's museum, I shall also quote the original notice of it, as follows:—"Upper part of the body dark brown, with slight undulations of a deeper tint; breast and throat longitudinally striped with brown: belly and under surface of the wings white, transversely barred with brown: tarse feathered to the lower third, each feather marked with fine transverse bars; the rest shielded: the beak short, much hooked, and sharp: claws and toes strong and formidable.

"It inhabits the banks of the Boorampooteer and other rivers in Assam, where it conceals itself in bushes and grass, along the verge of the water, seizing such fishes as approach the surface within its reach." This is also said to be the habit of the large naked-legged Owls which constitute the genus *Ketupa*.

Another species wanting to the Society's museum, and also distinguished by partially feathered tarse, may be described as

*Buteo aquilinus*, Hodgson. Length (of apparently a young female) about twenty-six inches, of which the tail measures eleven and a half; wing eighteen inches and a quarter; beak to forehead (in a straight line,) one and a half, and two inches and one-eighth to gape; tarse three and one-eighth, and plumed anteriorly for an inch and three-quarters. General colour hair-brown, the feathers edged with dull rufescent-brown, and their white bases shewing conspicuously about the nape; ear-coverts and sides of the head white, more or less dark-shafted; throat white, streaked with brown, the fore-neck coloured like the back, and the breast white for the greater portion of each



feather ; the remaining terminal portion mingled pale and dark brown, being also dark-shafted ; abdominal region and flanks, with the tibial plumes, dark brown, slightly rufous-edged towards the breast, and the axillaries more vividly rufescent ; fore part of the under surface of the wing dusky-brown, the primaries freckled white beneath, except beyond their emargination where they become blackish ; tail mottled with numerous dark bars, alternate on the two shafts of each feather, upon an albescent ground. Bill dark, as is apparently the cere : the toes appear to have been wax-yellow.

This bird might be mistaken, on a cursory view, for a variety of *B. canescens*, *J. A. S.* xii, 308. were it not for its half-feathered tarsi ; and the beak also is larger and more aquiline, so that the name is felicitously bestowed. It is by no means a common species in Nepal, as I learned from Mr. Hodgson's people, and as might be inferred from the circumstance of Mr. Hodgson requiring the only specimen he had sent, to take with him to England. Not improbably it may prove identical with the *Falco asiaticus* of Latham, described as nearly similar to the European Buzzard in the colour of its body and wings, the under parts white with stripes on the breast, tail silver-grey, the outer feather marked by obscure bars ; bill bluish-black, and legs yellow and *half feathered*. Length twenty-two inches. Inhabits China." From the circumstance of its partially feathered tarse, it might be presumed that the present species would fall under the division *Archibuteo* of Brehm, but the general character of the bird is not that of the 'Rough-legged Buzzard' of Northern regions.

*B. pygmæus*, nobis. This is the smallest species of true Buzzard with which I am acquainted. Length eighteen inches, or perhaps rather more ; of wing thirteen inches, and tail eight inches : bill to forehead (including cere) fifteen-sixteenths of an inch in a straight line, and an inch and a quarter from point of upper mandible to gape : tarse two inches, and feathered for nearly its upper third. Colour of the beak blackish, the cere and base of both mandibles appearing to have been yellow : legs and toes also yellowish, and talons black. General hue of the upper parts uniform hair-brown, the scapularies and coverts slightly tipped with rufous-white : nape white, tipped with brown, and slightly edged laterally with rufous, which colour increases on the sides of the neck and tinges the wings, the greater feathers

of which have their outer webs uniform brown, and the inner rufescent near the shaft and white towards the margin, being barred with the same brown as that colouring the outer web; the coverts are slightly edged and more largely tipped with dull rufous: the longer upper tail-coverts are tipped with whitish; and the tail is nearly of the same brown with the back, but rather paler and more greyish, its middle feathers having four broad dusky bars, the last subterminal, and a rudiment of a fifth which becomes gradually more obscure to the outermost: over and beyond the eye is a conspicuous whitish streak: the under parts are rufescent-whitish, palest on the throat and lower tail-coverts, which are without markings, excepting a slight dusky mesial line along the throat; the breast has a broad mesial dusky streak to each feather, assuming on the belly and flanks more or less the appearance of transverse bands, which are united along the shafts of the feathers leaving oval intervals of white, and the feathers being externally margined with pale fulvous: tibial plumes very pale buff, or with rufous central markings; and fore part of the under surface of the wings similarly coloured, the quills albescent underneath and obscurely barred, but dusky towards their tips. Inhabits the Tenasserim provinces, where procured by the late Dr. Helfer.

The other Indian species of true Buzzard are—*B. canescens*, Hodgson, upon the Himalaya, and spreading generally over the Upper Provinces—*B. longipes*, Jerdon, found chiefly to the west, but also in southern India—and *B. rufiventer*, Jerdon, peculiar (so far as known) to the south. Mr. G. R. Gray, in his catalogue of the *Raptores* in the British Museum, evidently mistakes *B. canescens* for *B. longipes*. From the description in the *Dict. Class.*, I suspect that the latter species is the *Circus pectoralis*, Vieillot, (placed, however, among the ‘*Buses*,’ or Buzzards, not among the ‘*Busards*,’ or Harriers,) in which case it must rank as *Buteo pectoralis*; but Mr. Jerdon, judging from another description of the latter, is of opinion that it cannot be identified with either of his species.

The *Circus teesa*, Franklin, v. *Astur hyder*, Sykes, assigned to *Buteo* by Gray and others, must now be referred to *Poliornis* of Kaup; *Bu-tastur*, Hodgson, *J. A. S.* xii, 311, sinking to the rank of a synonym.

*Hæmatornis*, Vigors (nec Swainson); *Spilornis*, G. R. Gray. The distinctive characters of the species referred to this genus are at pre-

sent much in need of determination. Firstly, there is the *Bacha* of Levaillant, or *Falco bacha*, Lath., which is described to be of the size of the Common Buzzard of Europe; female larger: this does not occur near the Cape, but was obtained far inland towards the tropic. Next, *Falco bido*, Horsfield, from Java, subsequently considered as identical with the African species by Dr. Horsfield: Mr. Vigors, however, in *Proc. Zool. Soc.* 1831, p. 170, "expressed his doubts whether the *Falco bacha*, Lath., and *F. bido*, Horsfield, were the same species, although they were generally supposed to be identical. He had not the opportunity of examining a sufficient number of African specimens to determine the point." Three species, however, were distinguished by Mr. Vigors on that occasion, that of India being described by the name *Hæm. undulatus*: but this Indian bird had previously been designated *Falco cheela* by Latham and Gmelin, and the young was termed *F. albidus* by Cuvier; it has also since been named *Circaëtus nipalensis* by Mr. Hodgson, and the young *Buteo melanotis* by Mr. Jerdon\*. The distinctions of Mr. Vigors's three species "consist chiefly in size, the *Hæm. holospilus* (from the Philippines) being one-third smaller than *H. bacha*; while *H. undulatus* considerably exceeds the latter. The first is spotted all over the body, the second only on the abdomen; while the third is marked by spots on the wing-coverts, and by *ocelli* bearing an undulated appearance on the abdomen, the breast also being crossed by undulating *fasciæ*." These last are chiefly seen in the females.

In Mr. G. R. Gray's catalogue of the specimens of Raptorial birds in the British Museum, specimens from India and Java are referred to *Spilornis bacha*, and others from India to *Sp. undulata*. I doubt, however, altogether the existence of more than one species in India, of which I presume that the males have been referred by Mr. Gray to *H. bacha*, and the females to *H. undulatus*; this latter name must indeed be superseded by *cheela* of Latham. But a specimen from Malacca agrees with the description I have lately received of Dr. Horsfield's Javanese bird, and differs from every one of a very extensive series of the Indian bird now before me—1stly, in its inferior

\* Latham's "Noble Eagle" would seem to be merely a fulvescent specimen of the young of this bird, such as are by no means uncommon.

size, the wing measuring but fourteen inches, and tail nine and a half\* ; 2ndly, in the absence of the distinct white spots on the small wing-coverts, the extreme bend of the wing only being thus marked, and slight traces of them alone shewing elsewhere ; and 3rdly, there is some difference in the barring of the primaries underneath, the third primary, for instance, having its subterminal pale band much narrower and ill defined, instead of this being broad and well defined. I should like, however, to examine several Malayan specimens before coming to a final decision ; although my impression certainly is that the Indian and Malayan species are distinct, and I shall provisionally regard them as such, terming the former *H. cheela*, (Lath.), and the latter *H. bido* (v. *bacha*?) At all events, I feel confident of their being only one species in India, and it is probable that there is one only in Western Malasia, but a third in the Philippines and China.

*Urrua* (Hodgson, founded on *Otus bengalensis*, Franklin, Gould,) *umbrata*, nobis. Length two feet or nearly so, of closed wing sixteen inches, and tail nine inches ; bill from point to gape nearly two inches, and tarse scarcely more. General cast of colour deep freckled umbre brown, unrelieved by fulvous ; the outer scapularies having the usual dull white oval spots on their exterior webs : wings dashed with cinereous : tail crossed with three dark bands, and an indistinct fourth at base : and the under parts pale, with a narrow dark brown mesial streak on each feather ; bill light yellow ; and talons pale. Aigrettes blackish-brown. The feathers of the crown and nape are dingy grey at base, with their surface portion freckled, and a narrow mesial dusky line on each : those of the back and the scapularies have this central dark streak much broader. This fine Owl is common in Lower Bengal, was forwarded from Nepal by Mr. Hodgson, and has been obtained by Mr. Jerdon in the Indian Peninsula. It is clearly that alluded to by Latham in his description of *U. (?) coromanda*, as represented in a drawing twenty inches long ; and it is the *Urrua coromanda* apud Hodgson, as noticed by him in *J. A. S.* vi. 373, having been forwarded by him under this name to the Society's museum.

\* In the India-house specimen, from Java, Mr. Strickland informs me that the wing measures fifteen inches and three-quarters, and the tail ten inches ; which size corresponds with that of the very smallest Indian specimens.



“ *Le petit Hibou de la côte de Coromandel,*” as described by Sonnerat, and upon which is founded *Strix coromanda*, Lath., and *Str. coromandelica*, Forster, does not appear to have been since verified; and the published drawing of an Owl, referred to this, in Hardwicke’s ‘Illustrations of Indian Zoology,’ represents a species unknown both to Mr. Jerdon and myself. It is not improbably a large *Scops*: this being a genus particularly rich in Indian and Malayan species, some of which are as yet not quite satisfactorily understood. Mr. Jerdon especially has made great efforts to elucidate them; and the following is about our present state of information respecting the group.

1. *Sc. rufescens*, (Horsfield), *Lin. Tr.* xiii. 140. This species has been determined with the assistance of Hugh E. Strickland, Esq., who has kindly examined the original specimens of the birds described in Dr. Horsfield’s Javanese list, and has favored me with more minute notices of some of them, and identifications of others with species previously described. Elsewise, as Dr. Horsfield had given the entire length as eight inches only, I had some hesitation in agreeing with Mr. Jerdon in referring a Malacca specimen in the collection of Lord Arthur Hay, to the present species; but the difficulty is now removed by my friend Mr. Strickland, and I have the pleasure of giving the following description from Lord A. Hay’s specimen. Length about eleven inches, of which the tail measures four inches and three-quarters; wing six and three-quarters; tarse an inch and a quarter. General colour ferruginous-brown, much paler below; the forehead, lower part of disk and aigrettes in part, conspicuously white, with a few minute dark speckles: upper parts marked with whitish spots along the shaft of each feather; the lower variegated with dusky and whitish in cross-striae: primaries and tail with numerous broad dusky bars, amounting to about twelve in number on the latter: tarsal feathers not continued over the joint at the base of the toes. A strongly marked species, apparently peculiar to the Malay countries.

The next in point of size is

2. *Sc. lettia*, Hodgson, *As. Res.* xix, 176: probably *Sc. lempiji* apud Horsfield, from Assam, *Proc. Zool. Soc.* 1839, p. 155. This is the largest of three closely allied species, the distinctions of which were first observed by Mr. Jerdon. Its wing measures from six inches to six and a half, apparently according to sex; and the young have a

more ferruginous shade of general colouring than the adults. In a living specimen which I saw, the most remarkable feature (for an Owl of this genus) was its very dark irides, appearing black : and Mr. Hodgson, in his description of the species, remarks, " Iris variable, yellow in the young, brown in the old birds". It inhabits the sub-Himalayan ranges, extending to those of Sylhet and Arracan, and doubtless to all those of Assam.

3. *Sc. lettioides*, Jerdon, *MS.* Differs from the last in its constantly smaller size, and more ashy colouring ; the short tarsal plumes appear to be always white, with at most obscure traces of mottling. From the next it also differs in its predominant ashy tinge. Length of wing five inches and a quarter to five and three-quarters. Peculiar to the Coromandel coast, and it would seem there generally common.

4. *Sc. lempiji*, (Horsfield) : *Strix noctula*, Reinwardt ; *Scops javanicus*, Lesson. Specimens which (from Mr. Strickland's description of Dr. Horsfield's Javanese bird,) I refer to this, from the vicinity of the Straits, are often deeply imbued with ferruginous-brown throughout : some of these being evidently in nestling dress, from the flimsy texture of the feathers ; and the others are perhaps in second plumage. Others, again, have merely a weak shade of ferruginous-brown like the young of *Sc. lettia* ; and the mottling of the upper parts is coarser and more blotched. The latter are perhaps distinct ; for while the former seem to be peculiar to the Malay countries, these occur not only in Malasia, but along the Malabar range, and in China. The Society possess a specimen from Macao. Future observation must determine whether the ferruginous-brown birds are so spread ; and specimens should be sought for that might exhibit a transitional moult.

5. *Sc. sunia*, Hodgson, *As. Res.* xix. 174. This beautiful species appears to be generally diffused over the country, though, it would seem, rather sparingly. Mr. Jerdon has obtained specimens near Nellore, and I have twice met with it in Lower Bengal. A very handsome adult female, shot near Calcutta, has the whole upper parts uniform bright chesnut-ferruginous, with inconspicuous black shafts to the dorsal plumage, tending to become obsolete, and more distinct black shafts to the frontal feathers, the aigrettes, and the fore-part of the wings ; exterior line of scapularies albescent, with conspicuous black tips ; and there are smaller black tips to the plumelets which

compose the disk : under parts deeply tinged with the hue of the back, but an admixture of pure white on the belly and under tail-coverts ; and the breast and sides of the belly have some tolerably broad black central streaks to the feathers, those of the latter being also variegated with transverse pencillings : the unspread tail has its bands obsolete ; and the bars on the outer webs of the primaries are indistinct. A male and female, apparently in second plumage, which I procured alive, have the ferruginous colour of the upper-parts somewhat deeper, though less bright, with the black centres to the feathers much more developed, and these are copiously variegated with cross-pencillings everywhere but on the forehead, crown, and the aigrettes ; the under parts have also a much greater admixture of white, and the black streaks and pencillings are considerably more developed ; primaries and tail conspicuously banded. The colouring of the nestling plumage would, however, seem to approximate more to that of the adult (and this, accordingly, may be likewise the case in *Sc. lempiji*) : it is distinguished by the usual weak and unsubstantial texture of the clothing feathers, and by the narrower and more pointed form of the wing-primaries.

6 *S. pennata*, Hodgson, mentioned in *J. A. S.* vi, 369, and recognised in Mr. G. R. Gray's list as distinct from the European *Sc. zorca*, to which it is nearly allied \* : *Strix bakkamoëna*, (?) Pen., and *indica* (?), Gmelin, founded on a rude drawing of a Cingalese specimen, no doubt inaccurate as regards the "scarlet" colour of the irides, the exceedingly small size given as that of nature (about four inches long), and also the excessively contrasted barring of the primaries ; likewise in the lower portion of the tarsi being represented as bare. The present species is smaller than any of the foregoing, its wing measuring from four inches and five-eighths to five and a quarter long ; and it so nearly resembles *Sc. sunia* in its general characters, that I formerly suspected it would prove but a grey variety of that bird : its under-parts are marked very like those of *Sc. sunia*, and there is a certain admixture of ferruginous especially about the breast, and a decided tinge of the same chiefly upon the large alars and their coverts, and seen elsewhere more or less upon the upper parts,

\* A specimen of *Sc. zorca* is there noted from China ; and this species has long been stated to occur in Northern Asia ; at least the *Strix pulchella*, Lin., of Russia and Siberia, has been currently identified with it.

as particularly about the aigrettes, that is very apt to induce a suspicion of its identity with *Sc. sunia*. From the other grey species, it is generally distinguished by the delicacy of its pencillings, and by those of the crown scarcely, if at all, differing from the markings of the back, instead of blending into a large black mass: but without a series of the *Sc. zorca* for comparison, it is quite useless to attempt giving a satisfactory minute description of this Indian bird, which is an inhabitant alike of the Himalaya and Southern India. A Malacca specimen in Lord A. Hay's collection also approaches very nearly both to this little Indian *Scops* and to *Sc. zorca*, of which latter I had a specimen on loan when I took the following brief description of his lordship's bird: "Darker-coloured and more uniformly pencilled (i. e. less variegated) above, than either *Sc. zorca* or *Sc. pennata*; and the tail marked with four or five distantly placed, and well defined, narrowish chesnut bands. Probably a distinct species." In the specimens of *Sc. pennata* before me, the tail-markings are comparatively ill defined, but consist of pale chesnut bands, margined with dusky, and the intervening spaces dotted with the same.

A *Sc. gymnopodus*, from India, is mentioned in Mr. Gray's catalogue, but which does not appear to have been yet described: and the same gentleman gives two new species from the Philippine Islands, *Sc. philippinensis* and *Sc. megalotis*.

The genus *Athene* is scarcely less developed in this part of the world. In India, we have

1. *Ath. cuculoides*, (Vigors). Common in the Himalaya, in the hill ranges of Assam, Sylhet, Arracan, and the Tenasserim provinces, and extending eastward to Chusan: but unknown in the ranges of peninsular India.

2. *Ath. Brodiei*, (Burton): *Noctua tubiger*, Hodgson; *Strix passerina* (?), mentioned in Royle's list. Himalaya.

3. *Ath. radiatus*, (Tickell): *Ath. erythropterus*, Gould; *Noctua perlineata*, Hodgson; *N. cuculoides* apud Jerdon, *Catal.* Himalaya, and the ranges of Central India.

4. *Ath. castanopterus*, (? Horsfield): *Strix spadicea*, (? Reinwardt). Malabar range, and the upland districts of Ceylon. This species differs from the last in its more rufous general colouring, especially on the whole wing, the basal portion of the primaries (except the three first)



being spotless deep rufous. A Cingalese example, procured by H. R. H. Prince Waldemar of Prussia, had the entire back and wings deep rufous-bay; while the pale bars on the head were only a little more rufescent than in *Ath. radiatus*. *Ath. castanopterus*, from India as well as Java, is mentioned in Mr. Gray's list of British Museum *Raptors*; and it is also stated to occur in the Tenasserim Provinces.

5. *Ath. Sonnerati*, (Tem.) *Non. vidi\**.

6. *Ath. brama*, (Tem.): *Noctua indica*, Franklin; *N. tarayensis*, Hodgson; *Strix persica*, (?), *Nouv. Dict. d'Hist. Nat*, vii., 26.† Very common in Lower Bengal, and in India generally.

A *Noctua auribarbis* is mentioned by Mr. Hodgson, *J. A. S.* vi., 369; and an *Ath. badia*, Hodgson, in Mr. G. R. Gray's list of the Raptorial birds in the British Museum. These remain to be described.

*Syrnium nivicolium*, Hodgson, *n. s.* This so nearly resembles certain non-rufous specimens which I have seen of the European *S. aluco*, that I even suspected the identity of the Himalayan and the British birds, until a second specimen (presented to the Society by Mr. Jerdon) repeating the characters of the one which Mr. Hodgson took with him to England, inclines me now to the opinion that they are distinct; the present being also decidedly a larger bird. The length of Mr. Hodgson's specimen was about seventeen inches, of wing eleven and a half, and tail seven and a quarter; tarse two inches: and I took the following brief description of it. "Colour of the upper parts mingled brown and blackish; rather minutely mottled, producing a dark brown *ensemble*; head and neck tawny or fulvous-brown, with dark mottling at tips of feathers; a streak above each eye, ascending from the facial disk, and the mesial part of the crown, between these streaks, blackish. Under parts bright tawney-brown, mingled with dark brown and whitish: feathered tarsi and toes fulves-

\* "Inhabits India. Length eleven inches; all the upper-parts of the body are reddish-brown, the head being adorned with small white spots, and the wing-coverts with large spots of the same: the quills and tail-feathers are like the back; the space round the eyes is reddish-white, as well as the face and throat: all the under-parts are white, transversely but distantly barred with brown: the down on the tarsi and toes is red: the beak and claws are yellow."—*Stephens*.

† *Ath. brama* is common about the foot of the mountains near the town of Erzeroum. *Proc. Zool. Soc.* 1839, p. 119.

cent, with deeper tawney spots; alars and tail banded, the latter with mottled light brown upon a dark ground." The second specimen (also Himalayan) has the wing twelve inches and a quarter long, and the tail seven and a half. It agrees generally with the foregoing description, but has less of the fulvous tinge, and is, I think, more obviously distinct from *S. aluco*. The minute mottling of the plumage is difficult to express in words: but the feathers of the under parts may be described as whitish, partially tinged with fulvescent, and having a dusky central streak, broader towards the tip of the feather, and three or four narrower transverse streaks of the same; and the like may be described as the basis of the markings of those above, modified so that the pale portion appears, more or less, as a series of pale spots on the two webs of each feather;—the well developed transverse markings of the feathers constituting a good distinction of this bird from the European *S. aluco*, independently of its deficiency of rufous colouring. The form is perfectly true to the generic type of *S. aluco*.

Of the species of *Strix*, as now limited, three pertain to the *Fauna Indica*.

1. *Str. javanica*, Gm., de Wurmb, apud Latham: *Str. candida*, Tickell, *J. A. S.* II. 572; *Str. longimembris*, Jerdon. Buchanan figured it; but Latham is wrong in stating that the claw of its middle toe is not serrated; and it has also four well defined blackish bars on the tail. Found chiefly in peninsular India. Whether it be truly de Wurmb's Javanese species, I have no immediate means of ascertaining\*.

2. *Str. flammea*, Lin.: *Str. javanica*, apud Horsfield (?), Sykes, and Jerdon. Very common, and differing in no respect from the British bird.

3. *Str. badia*, Horsfield. Mr. Hodgson obtained a single mutilated specimen of this bird in Nepal; and the Society has been favored with a very fine one by Captain Abbott, shot in the island of Ramree, Arracan. About Malacca and Singapore, it would seem to be not uncommon.

\* "Horsfield's *Strix javanica*," writes Mr. Strickland, "has the tarsi five-eighths of an inch longer than in a British *Str. flammea*. It comes near *longimembris*, Jerdon, but is mottled grey above, instead of blotched with brown." Dr. A. Smith has figured a species from South Africa, allied to true *javanica* (? v. *longimembris*), by the name *M. capensis*.

We will now leave the *Raptores*, and commence the varied tribes of Perchers with a new Hornbill :

*Buceros carinatus*, nobis. Length about thirty-two inches, of wing thirteen and a quarter, and tail a foot, its outermost feathers an inch shorter than the middle ones : bill to eye five inches, the casque little elevated, at most about three-quarters of an inch, and the depth of bill and casque together two inches and a quarter. Form of the casque truly carinate, like the keel of a boat, rising with a curve from the forehead, extending for two-thirds of the length of the upper mandible, and its anterior portion sloped forward : a lateral ridge exterior to the nostrils causes these to open upwards. In one specimen before me, (which I suspect is an old female,) the bill and casque are wholly black ; but in another, with the latter somewhat less developed, (probably an adolescent male,) the bill is yellowish-white, except the basal two-thirds of the lower mandible, and the extreme base of the upper, continued along the tomixæ for half its length, and along the upper portion of the casque to near its extremity. In the former specimen, the medial portion of the belly, the vent, and the lower tail-coverts, are dark brownish-albescent ; while in the latter this is confined to the vent and lower tail-coverts : but there is no other difference of plumage. The throat is naked, as likewise a large space surrounding the eyes. Occiput adorned with a large full crest of lengthened feathers, rounded at the tips, and measuring two inches and three-quarters long, or rather less in the black-billed specimen (or old female?). General colour black, with green and purple glosses, the edges of the secondaries and tertiaries, and of the lengthened occipital feathers (more or less), whitish-brown—much as in *B. gingalensis*, to which the present species is certainly allied : terminal four and a half to five inches of the tail deep black, the rest brownish-ashy, darkest at base, and paling to its junction with the black. In both specimens the edges of the mandibles retain their original serration, more or less perfectly, which is seldom seen in adult Hornbills. Procured at Malacca by the Rev. F. W. Lindstedt, to whom the Society is indebted for a large and valuable collection of the mammalia and birds of that particularly rich, but little explored, locality.

The *B. comatus*, Raffles, *Lin. Tr.* xiii, 339, would seem to be allied to the above in form of bill, but is evidently distinct. *B. malayanus*, Raffles, *ibid.* p. 292, would seem to approximate the adolescent *B.*



*bicolor*, Eyton, except that it has "a white stripe extending from behind each eye to the back of the neck, and so encircling the head." *B. bicolor* is probably the *B. malabaricus* apud Raffles, and *B. albirostris* apud Horsfield; and with reference to my description of this species in *J. A. S.* xii, 996, I may mention that the casque does project forward, and very prominently, in old specimens. Of the other species noticed on the same occasion, I have been since informed that *B. cristatus*, Vieillot (p. 988,) has been renamed *B. buccinator* by Mr. Gray; *B. pucoran* (p. 990, as Swainson misled me in spelling it,) should have been written *B. pusaran*, it being rightly identified with the bird of Raffles; *B. malabaricus* (p. 993,) must rank as *B. pica*, Scopoli; and *B. ginginianus* (p. 996,) as *B. birostris*, Scopoli, the names given by this author holding priority over those of Latham and Gmelin. Lastly, with respect to Raffles's assertion that the females of *B. rhinoceros* are rather smaller, and have the horn more recurved than in the male, it shews that that respected observer was unacquainted with the perfectly matured male, which not only is larger than the female, but has the tip of its casque reflected so as to point downward, whereas in the female (so far as I have observed) it rarely, if ever, even points backward: the sexes in this species being readily distinguishable, like those of *B. cavatus*, *B. pica*, and other allied species, by the *posterior* surface of the horn, above the forehead, being black in the male, and concolorous with the rest in the female; besides which the male Rhinoceros Hornbill has a black line dividing the bill and casque, and continued forward and upward upon the latter, parallel with its anterior margin. It may be remarked further, of the Rhinoceros Hornbill, that this species seems to wear away the cutting edges of its mandibles more than any other; so that when the tips meet, a wide hollow occurs along the medial portion of its bill.

Genus *Irrisor*, Lesson. In the 'Annals and Magazine of Natural History' for 1843, pp. 238 *et seq.*, is inserted a paper read by Mr. Strickland to the Zoological Section of the British Association Meeting of that year, wherein is argued the near affinity of this well marked genus for the Hoopoes (*Upupa*), in opposition to the opinion of the Baron De la Fresnaye and others, who have contended that these two genera are, at most, but very distantly allied: and though Mr. Strickland has hazarded no decided opinion respecting the immediate affinities of the combined group formed of *Irrisor* and *Upupa*,

which group he styles *Upupidæ*, and regards its two generic sections to be of the value of subfamilies, adding the remark, that the question where the *Upupidæ* should be placed cannot, as he thinks, "be answered satisfactorily till more facts are collected respecting the food, habits, and anatomy of this group and of others with which it may be compared," I may here notice that while I quite agree with Mr. Strickland in approximating the two genera under consideration, I still retain my conviction expressed several years ago (vide *Mag. Nat. Hist.*, n. s., 1838, p. 593), and formed upon anatomical data, that the Hoopoes are nearly related to the Hornbills; and the hiatus between these two allied, but distinct, groups is considerably lessened by the interposition of *Irrisor*, which genus I suspect is subordinate to *Bucerotidæ* rather than to *Upupidæ*, and as a subfamily of the former, I conceive it to be most naturally placed. In the configuration of the sternal apparatus, the chief differences occur in the anatomy of the Hornbills and the Hoopoes, the alimentary organs presenting a very close similitude; and in the form of the sternum and its appurtenances, I will venture to hazard the conjecture that proof will be afforded of the near affinity of *Irrisor* for *Buceros*. As in both *Buceros* and *Upupa*, I observe that *Irrisor* has only ten tail-feathers, whereas the allied genera of *Halcyonidæ*, &c. have twelve; and perhaps we should not be wrong in arranging both *Irrisorinæ* and *Upupinæ* as subfamilies of *Bucerotidæ*.

Hoopoes (*Upupa*, Lin.) There are three distinct, although closely allied, species of this genus, as follow:

1. *U. epops*, Lin. The common European Hoopoe, which is numerous in Bengal, and in Upper India generally, but of rare occurrence in the south of India. Mr. Jerdon has obtained it in the Neilgherries. Length of its wing six inches.

2. *U. senegalensis* (?), Swainson, 'Birds of W. Africa,' ii, 114, *Nat. Libr.*: *U. minor*, apud Jerdon. This quite agrees with Mr. Swainson's description of the Senegal Hoopoe, except that some specimens have a trace of whitish on the hinder crest-feathers, where indeed it chiefly appears in *U. epops*. The wing varies from four inches and three-quarters to five and three-eighths in length; but the bill is as much elongated as in the last. Common in most, if not all, parts of the peninsula of India.

3. *U. minor*, Shaw. Distinguished from both the preceding by having the primaries plain black, without the broad white band con-

stant in the two others; and also by having the white caudal bar placed much nearer the base of the tail. The colour, too, especially of the crest, is more rufous, and there is no intervening white or whitish between the rufous portion of the crest-feathers and their black tips. Length of the wing five inches and a quarter. It has only been met with in South Africa.

Specimens of each are in the Society's Museum.

*Alcedo grandis*, nobis, n. s. Resembles *A. ispida* and *A. bengalensis*, but is distinguished by its much larger size. Length of wing three inches and three-quarters, of tail two inches, and of bill to forehead two inches and one-eighth. From Darjeeling. It may be remarked that several specimens of *A. bengalensis* occurred in the same collection with *A. grandis*, which I mention with a view to refute the opinion entertained by some theorists, that the disparity of size between either of these species and *A. ispida* is due to the influence of climate and other local causes.

*Halcyon capensis*, (L.) Specimens of this bird (if absolutely the same,) from the vicinity of the Straits, differ from those of India in being much more intensely-coloured, both above and below; the ferruginous of the under-parts, which is very deep in apparently the males, suffusing the nuchal collar and throat, which latter does not tend to be albescent, and there is a considerable bluish-green gloss upon the brown cap, never seen in Indian specimens, and reminding one of the cap of *Todiramphus collaris*, (Scopoli and Swainson, v. *chlorocephalus* of Gmelin.) In fact, there seems as good reason for distinguishing these Indian and Malayan birds as species, as exists in the instance of *Cergle rudis* of Africa, and *C. varia*, Strickland, of Asia; and another example of a Malayan bird which greatly exceeds its Indian representative in intensity of colouring, occurs in the common Jungle-cock of the two regions, alike referred to *Gallus bankivas*, Tem.

*Coracias affinis*, McClelland and Horsfield, *Proc. Zool. Soc.* 1839, p. 164. The numerous specimens of Rollers from Assam, Arracan, and Tenasserim, which I have seen, all pertain strictly to this species; having the upper parts greener than in *C. indica*, the neck and breast devoid of the reddish-brown colour proper to the latter species, being purplish-dusky varied with bright purple on the fore-neck, and the entire under surface of the wing, except near the tips of the primaries, is deep purple: but I have obtained several specimens in the vicinity of Calcutta, and some from Tipperah, which present every gradation of plu-

mage from one to the other of these species, and also one or two in the pure *affinis* plumage; from which I infer that where found together in the same locality, they not unfrequently interbreed, and tend to merge into a single blended race. It may be further remarked that I have never seen an example of true *C. affinis* with the broad terminal purple band to the tail, which distinguishes the adult *C. indica*; but I have seen this imperfectly developed in the mixed race, which latter has also commonly the fore-part of the under surface of the wing intermingled purple and verditer. On the western side of India, the *C. garrula* was obtained, together with *C. indica*, by Sir A. Burnes in the Moultan; and both this and *Merops apiaster* are common in Afghanistan. Whether the *C. indica* and *C. garrula* likewise intermix, remains to be ascertained.\*

Woodpeckers. Of the species of this group noticed in *J. A. S.* XII, 998 *et seq.*, I have now to remark, that *P. (Gecinus) viridanus* would seem to be the *P. dimidiatus* of the *Dict. Class.*, though not of Hardwicke and Gray; *P. occipitalis*, Vigors, should be termed *barbats*, Gray (if it be not *affinis* of Raffles), as there was previously a *P. occipitalis*, Valenciennes; *P. nipalensis*, Gray, may, I think, be safely referred to *P. chloropus*, Vieillot, as I before suggested †; *P. (Chrysocolaptes) melanotus*, nobis (p. 1005, and XIII, 394,) v. *P. Ellioti*, Jerdon, is decidedly the *P. goënsis*, Gm., founded on the *Pic vert de Goa* of Daubenton; and *P. (Chr.) strictus* of Horsfield, v. *sultaneus*, Hodgson, v. *strenuus*, Gould (noticed in *Proc. Zool. Soc.* 1839, p. 165, and also in Dr. Royle's list of birds from the neighbourhood of Saharunpore, though never, I believe, described by this name), which has been commonly referred to *P. goënsis*, must retain the name *strictus*, Horsf.: lastly, having obtained a Malacca specimen of *Microcolaptes abnormis*, Tem. (p. 1005), I am enabled to confirm my former suspicion of the near affinity of *Sasia ochracea*, Hodgson, which, though distinct as a species, is most closely allied to *M. abnormis*. *M. ochraceus* is common in the hill ranges of Assam, Sylhet, and Arracan, being generally seen hopping from twig to twig of bushes or low branches of trees, though occasionally climbing like an ordinary Woodpecker.

\* Two specimens just received from Gow-hatti (Assam) were both pure *C. affinis*; while three others from the neighbouring district of Rungpore were unmixed *C. indica*.

† This bird makes a near approach in structure to *P. (Dendrobates) immaculatus*, Sw. (received from the Cape): accordingly, it would appear that *Dendrobates* is scarcely, if at all, separable from *Gecinus*.



*Picus (Gecinus) malaccensis*, Lath., founded on *le Pic de Malacca* of Sonnerat, may be described anew with advantage from specimens presented to the Society from Malacca. It is allied in size and form to *P. chloropus* (v. *nipalensis*), and in plumage also to the species of *Brachylophus*, but differs very decidedly from the latter in the shape of its bill, which is larger and more that of a typical *Gecinus* than the *Dendrobates*-like beak of *P. chloropus*: it has also the yellow nuchal crest less developed than in the latter, and resembling that of *Brachylophus puniceus*. General colour dingy green, brightest on the back, where more or less tinged with yellow, especially on the rump; beneath inclining to dusky, barred with dull white on the flanks, but the latter less predominating than in *P. chloropus*: wings crimson, with dusky primaries, and green tips to the longest tertiaries: tail black. The male has the whole top of the head, lengthened occipital feathers, and moustaches, crimson; while the female has the coronal feathers green, tipped only with crimson, and merely the long occipital feathers as in the male, below which those of the nape are yellow in both sexes. Bill dusky above, the lower mandible yellow; and feet have apparently been green. Length ten inches, or nearly so; of wing four and three-quarters to five inches; and tail three and a half to three and three-quarters; bill to forehead an inch and a quarter. From Malacca.

Subg. *Gecinulus*, nobis. This is a third form of three-toed Woodpecker (in addition to *Picoides*, Lacep., of northern climates, and *Tiga*, Kaup, v. *Chrysonotus*, Sw., of south-eastern Asia and its islands), most nearly allied to *Gecinus*, from which it differs in the shortness and lateral compression of its beak, and the small size of the feet, which have besides no inner fourth toe. As a peculiar form of Woodpecker, it is very distinct, though represented only (so far as I am at present aware,) by

*P. (Gec.) Grantia*,\* McClelland and Horsfield, *P. Z. S.* 1839, p. 165. Length nine inches and a half, or ten inches; of wing five inches; and tail three and three-quarters: bill to frontal bone an inch and one-eighth; and spread of foot an inch and three-quarters. Colour somewhat brownish red above, the secondaries and tertiaries having three light red bars, and the greenish-dusky primaries four or five yellowish ones: tail similarly banded; breast and under parts dusky-

\* Quære, *Grantii*, or *Granti*?

green; head and neck light yellowish-green, paler and browner towards the beak, and the crown of the male only, dull crimson. Bill white, with some dusky at the base of both mandibles; and feet apparently dark slaty. Hab. Darjeeling, and the mountain ranges of Assam.

Of the subgenus *Tiga*, Kaup, three allied species exist, which have never been yet properly distinguished.

1. *P. (T.) Shorei*, Vigors, *P. Z. S.* 1831, p. 175; Gould's 'Century,' pl. XLIX. Distinguished by its superior size, the wing measuring six inches long; by the crimson of the rump spreading over, or rather tinging, more usually the entire back (more or less); and by the elongated pale central streaks of the coronal and occipital feathers of the female, these streaks being continued nearly throughout the feather, and anteriorly often spreading over the whole feather, so that the forehead becomes almost plain light brown. In one female before me, there are also some intermixed crimson feathers on the occiput, which I have never seen in either of the other species: but whether these are of constant occurrence I do not know, and another female in the Society's museum is unfortunately deficient of feathers just at this part. Inhabits the sub-Himalayan region, as well as the hill ranges of peninsular India; but I have never seen it from the eastward of the Bay of Bengal.

2. *P. (T.) intermedius*, nobis. Exactly midway between the two others; the whitish on the coronal feathers of the female forming very elongated spots, rather than central streaks; and the back above the rump not usually suffused with crimson. Wing five inches and a half to five and three-quarters long. Common in Nepal, Assam, Sylhet, Tipperah, Arracan, and Tenasserim; and the only kind which I have seen from those parts, Nepal excepted.

3. *P. (T.) tridactyla*, (Sw.) Strickland; *Picus tiga*, Horsfield. Wing but four inches and seven-eighths, to five inches and one-eighth, long: and the whitish spots on the head of the female very much contracted, tending indeed to become obsolete, and their form a lengthened oval, narrow and minute. The bill to gape in *P. Shorei* measures an inch and three-quarters, in *P. intermedius* one and a half, and in *P. tridactyla* one and a quarter; in a young female of *P. tridactyla* before me, scarcely one and one-eighth. The specimens described are from Malacca, and are of the only size that I have hitherto seen from the Malay countries. Dr. Horsfield, however, gives the length of his *P. tiga* as eight inches and a half; whereas Raffles



assigns "above ten inches," and may therefore allude to *P. intermedius*. From peninsular India, I have as yet only seen *P. Shorei*: but Mr. Jerdon remarks that "the specimens shot below the Ghauts are considerably smaller than those obtained at a great elevation; the latter attained the size of *P. Shorei*, though not differing in colour from the smaller ones. The length varies from nine inches and a half to nearly twelve inches."

Of the closely allied division *Brachypternus*, Strickland, there seems to be a second species in southern India, additional to *P. aurantius* (v. *bengalensis*, &c.):

*P. (Br.) micropus*, nobis. Distinguished from *P. aurantius* by its inferior size, the wing (of an adult male,) measuring but five inches, instead of five and a half, as in several adult specimens (male and female,) of *P. aurantius*; bill to gape an inch and five-sixteenths, instead of one and five-eighths; and extended foot one and seven-eighths, instead of two and one-eighth. There is a general neatness and well defined character of the markings, as distinguished from those of *P. aurantius*, which arrests the eye at a glance: the frontal feathers, to a level with the anterior portion of the eye, are not tipped with crimson, as in the other; the black of the nape is continued lower upon the shoulders, considerably contracting the golden orange of the back; and the wings are duller aureous, contrasting more with the brilliant dorsal hue: the white markings of the throat and fore-neck are also reduced to small rounded oval spots, those of the breast being larger but similarly oval, and of the under parts below, narrower than in *P. aurantius*. I found this species upon a single specimen forwarded by Mr. Jerdon, but feel no doubt of its distinctness, especially when I recall to mind the close similitude of the three species of the preceding group; from which division the present one is only just separable.

*Micropternus*, nobis. By the same rule that *Brachypternus* is recognised apart from *Tiga*, this must be separated from *Meiglyptes*; having the inner fourth toe and claw minute. The colouring is also peculiar. Type *P. badius*, Raffles, under which, again, two species have been hitherto confounded.

1. *P. (M.) badius*, Raffles: *P. brachyurus*, Vieillot. Wing but four inches and one-eighth to four and a quarter long: head pale above, the throat dark; the feathers of the latter dusky, with pale lateral

margins; black caudal bars comparatively broad. Inhabits the Malay countries.

2. *P. (M.) phaiiceps*, nobis. *P. rufus*, Lath., apud Gray, nec Gmelin; *Rufous Indian Woodpecker*, Latham. Wing four inches and three-quarters long, and the rest in proportion: head subfuscous above, the throat pale; the feathers of the latter concolorous with those of the body, or nearly so, having lighter lateral margins; black caudal bars narrow. Inhabits India proper, extending eastward to Tipperah and Arracan.

The type of *Meiglyptes* is *P. tristis*, Raffles, v. *pæcilophus*, Temminck,\* which together with an allied species, *P. (M.) brunneus*, also from the Malay countries, is referred to *Hemicercus* by Mr. Eyton.

*P. (M.) jugularis*, nobis, is a third species, of a shorter and thicker form than the two above-mentioned, and in size, form, and colouring, much resembling *P. (Hemicercus) canente*, Lesson, of which the female is *P. cordatus*, Jerdon: but it is readily distinguished by the very different form of the bill, by the buffy-white colour of the nape, and by the rays or specks of the same hue upon its black throat. Length about seven inches and a half, of wing four inches, and tail two and one-eighth; bill to forehead seven-eighths. Colour black or brown-black, varied with buffy-white, and an obscure dull crimson moustache in the male; occipital feathers elongated and black: neck whitish, more or less deeply tinged with buff, and continued as a streak along each side of the breast in front of the wings; rump also buffy-white, a broad oblique stripe of the same upon the wings, and their nether surface and edge are of this hue, the large alars being broadly banded at base internally, with slight narrow pale bars or series of small spots on their outer surface; forehead, throat, and sometimes crown, more or less speckled or rayed with the same pale colour that variegates the rest of the plumage. Inhabits Arracan and the Tenasserim provinces (specimens from the latter territory having been erroneously referred to *P. pæcilophus*, Tem., in X, 828).

*P. (Hemicercus) concretus*, Tem. It is probable that there are two species confounded under this name. All that I have seen are from the vicinity of the Straits, and accord with Stephens's "Sumatran va-

\* These would seem enumerated as distinct in Mr. Eyton's catalogue, *Proc. Zool. Soc.* 1839, p. 106; but it is evidently a mistake of the printer.

riety" of *P. concretus* of Java. The adult male has the forehead and crown bright crimson, continued on a few of the uppermost and central of the long feathers of the occiput: in the young male, the forehead and crown are chesnut-brown, with a tinge of red on the medial long feathers of the occiput; the pale yellowish buff portion of the plumage of the upper parts being also more developed: and the female has the forehead, crown, and occiput, smoky-grey, like the sides of the head of the males.\*

*P. (Dendrocopus) darjellensis*, nobis. This Woodpecker is described in *J. A. S.* XI. 165, as the adult of *P. himalayensis*, Jardine and Selby; and true *P. himalayensis* is there given as the young: but the two are distinct, the present one having a larger bill, measuring an inch and three-eighths to forehead, in addition to its under parts being streaked with black; its white wing-spot is also considerably smaller. Very common at Darjeeling, and in Nepal. Mr. Hodgson sent it by the hybrid name *majoroides*, which can scarcely be adopted.

The other Indian Woodpeckers of this subgenus are as follow:—

2. *L. himalayensis*, Jardine and Selby, *Ill. Orn.*, 1st. series, pl. CXVI. Found chiefly, I suspect, to the westward of Nepal.

3. *P. cathpharius*, Hodgson, nobis, *J. A. S.* XII, 1006. Nepal: common at Darjeeling.

4. *P. hyperythrus*, Vigors, *P. Z. S.* 1831, p. 23; Gould's 'Century,' pl. L. Remarkable for the slender form of its bill. Himalaya.

5. *P. Macei*, Cuv.; figured in Hardwicke's *Ill. Ind. Zool.*: *P. analis*, Tem.; *P. minor*, apud Raffles and Horsfield; *P. medius* from India, apud Latham. Northern India generally, and Malay countries. The only species of the subgenus found in Lower Bengal, where exceedingly common, as it also is in the vicinity of the Straits. It frequently occurs, likewise, in collections from the Himalaya.

6. *P. brunnifrons*, Gould's 'Century,' pl. LII; Vigors, *P. Z. S.* 1831, p. 176.: *P. auriceps*, Vigors, *ibid.* p. 44. Himalaya.

7. *P. mahrattensis*, Latham: *P. aurocristatus*, Tickell, *J. A. S.* II, 579: figured in Gould's 'Century,' pl. LI., and also by Hardwicke and Gray. Hilly regions of India generally.

\* *P. validus*, Tem., is allied in form to *Hemicercus*, but cannot be arranged under it: and as another marked sub-genus, I may indicate the *P. funebris*, Valenciennes, v. *modestus*, Vigors.

8. *P. pygmaeus*, Vigors, *P. Z. S.* 1830, p. 44. A description of this species, from a series comprising older and finer specimens than those from which the Latin diagnosis was drawn up, may here be offered. Allied to the two next, but larger; the wing measuring from three inches and a quarter to three and a half, and tail one and seven-eighths to two inches. Four middle tail-feathers wholly black, and the next white only on its exterior margin: this constituting a good distinction, as in all the following the whole of the tail-feathers are spotted with white. The male has a crimson occipital crescent, the lateral halves of which unite only in fine old specimens: in younger examples, this crimson is confined to a mere lateral tuft, as in the following; and I have seen specimens in every degree intermediate. Forehead and crown ashy-brown, the crimson of the occiput surrounded with black externally, forming a streak over each eye, continued to meet and expand posteriorly. Another and brownish-black streak, more or less developed, passes backward from below the eye; and between this and the last is a large triangular white patch on the sinciput. Upper parts black, with white cross-bands on the back, and the usual rows of white spots on the wings: outermost and penultimate tail-feathers barred on the outer web with white, and having a single white bar, and sometimes two, crossing the feather towards its tip; throat dull white; the rest of the under parts brownish-white, with narrow dark central lines to the feathers. The hoary-grey colour upon the back mentioned in Mr. Vigors's description, must refer to that of the base of the feathers, as shewn in a specimen thin of plumage. Common in the Himalaya.

9. *P. canicapillus*, nobis. Differs from *P. moluccensis* in the much blacker hue of its upper parts, in the pale ash-colour of the head, a little tinged with brown and bordered laterally with black, from amid which appears the slight crimson sincipital tuft of the male; the size also is rather larger, the wing measuring three inches and one-eighth to three and a quarter, tail one and three-quarters, and bill to forehead five-eighths: the under parts are whitish, purer on the throat, and the rest marked with central dusky-black lines. Common in Arracan.

10. *P. moluccensis*, Latham; figured by Hardwicke and Gray. Distinguished by its prevalent brownish or sooty-black colour, and its rufescent brown head and streak passing through the ear-coverts. Hab. Central and Southern India.

10. *P. nanus*, Vigors, *P. Z. S.* 1830, p. 172. Has a larger bill than either of the three preceding species, measuring three-quarters of



an inch to the forehead; wing three inches and a quarter. The breast is marked with dusky *oval spots*, passing into streaks below; the aspect of the under parts being much more spotted and less streaky than in the foregoing; a very strongly marked white line commences above the eye (as in the last), and is continued along the sides of the occiput to the nape; and another broad white line from the angle of the mouth is continued to below the ear-coverts. This species is alluded to as a variety of *P. moluccensis* by Mr. Jerdon; being thus met with in Southern India, as well as in the Himalaya.\*

Of foreign Woodpeckers in the Society's museum, one of which I can find no description, may be designated

*P. (Colaptes) hypoxanthus*, nobis. Length above a foot, of wing five inches and three-quarters, and tail five inches; bill to gape one and three-quarters, its form less curved than in *P. auratus*, the lower mandible not being arched at all. Upper parts crimson, darker on the wings, and passing to yellowish olive-green on the external webs of the large alars, the secondaries and tertiaries with their coverts being broadly margined with dark crimson externally, and the primaries having yellow shafts: tail black above, its outermost feathers freckled with brownish-yellow: a large and broad crimson moustache, and the space between this and the crown, comprising the lores and ear-coverts, greenish-yellow: throat black, the feathers edged with yellowish; those of the breast black margined with dark crimson, and leaving a pale central mark on each, inclining to be linear on those of the fore-neck, and gradually assuming the form of a transverse bar more downward: the rest of the under parts and inside of the wings bright greenish-yellow, with some black bars anterior to the flanks. Bill blackish; and legs brown. Most probably from some part of South America.

Before quitting the *Picidæ*, I may remark that the Himalayan Honeyguide (*Indicator xanthonotus*, nobis, *J. A. S.* XI, 166, and XII, 1010,) has a much shorter beak than in the various African species; with which it accords, however, in all other respects.†

\* The whole of the above are in the Society's museum: and I have before remarked that *P. Ellioti*, Jerdon, which was referred by that naturalist to the present sub-genus, is the true *P. (Chrysocolaptes) goënsis*, *v. melanotus*, nobis, *passim*.

† To give some idea of the present state of the Society's museum, in the department of Ornithology, it may be here mentioned that of the Linnæan genus *Picus*, there are now 121 mounted specimens, appertaining to 49 species; and of these but 10 speci-

*Cuculidæ*. Of the series of this family grading from *Dasylophus* to *Taccocua* of Lesson, the Indian and Malayan species may be thus classified. *Rhinortha* belongs to the particular group, but ranges apart from the graduated succession observable in the rest: and of this genus, I have to remark that the supposed two species which have been hitherto currently admitted, are one and the same; *Rh. lucida*, Vigors, v. *Anadænus rufescens*, Swainson, v. *Phœnicophans viridirostris*, Eyton, referring to the young, and *Cuculus chlorophæus*, Raffles, v. *An. rufus*, Swainson, to the adult; the latter being also described, and the former figured as *Bubutus Isidoria* by M. Lesson in the zoology of M. Belanger's Voyage. It will now rank as *Rh. chlorophæa*, (Raffles); and I have suggested that perhaps a second species exists in the *Cuculus melanogostir* of Vieillot, vide *J. A. S. XI.*, 924.

*Dasylophus*, Sw. Species, *D. Cumingi*, (Fraser,) and *D. superciliosus*, (Cuv.) vide *J. A. S. XI.*, 925.

*Phœnicophans*, Vieillot.—*A.* With the nareal apertures narrow, and placed near the edge of the bill. (Cuv.) 1, *Ph. pyrrocephalus*, (Forst.,) vide *J. A. S. XI.*, 924: (this species has the papillose naked red skin on the sides of the face very greatly developed; its alleged Cingalese habitat needs verification, especially as it is likewise stated to inhabit Africa.) *B.* “Nostrils elongate, and situate at the base of a groove which extends nearly to the middle of the beak.” (Horsfield.) 2, *Ph. melanognathus*, Horsfield. *C.* Nostrils elongate, basal, and oblique; but no groove to the bill. 3, *Ph. sumatranus*, Raffles, *D.* Nostrils basal, with rounded aperture. 4, *Ph. viridis*, Lev. (*Cuculus melanognathus* apud Raffles, &c.): 5, *Ph. Diardi*, (Lesson; *Ph. tristis* apud, *J. A. S. XI.*, 928, and probably *Ph. Crawfordii*, Gray). *E. Incertæ sedis.* 6, *Ph. (?) calorhynchus*, Tem., erroneously stated to be identical with *Zanclostomus javanicus*. Three of the above are in the Society's museum, viz. *Ph. viridis*, *Ph. sumatranus*, and *Ph. Diardi*; these being all common in the vicinity of the Straits. The first has a more tumid bill, and the second a proportionally

mens (of 7 species) are foreign to India and the Malay countries. Of other *Picidæ* (consisting of the genera *Yunx*, *Picumnus*, *Microcolaptes*, and *Indicator*, the *Bucco* group being excluded), we have 10 mounted specimens, of 7 species. Every described (or at least every authenticated) Indian species of Woodpecker is now in the collection: but there are several yet wanting from the eastern islands. *July 6, 1845.*



longer bill, than in the others ; but all are closely allied, and have a large naked space surrounding the eyes.

*Zanclotomus*, Swainson. *A.* Bill green ; nostrils with rounded oval aperture ; small bare and papillose skin surrounding the eyes ; tail greatly elongated. 1, *Z. tristis*, (Lesson ; *Ph. longicaudatus*, nobis, *J. A. S.* XI, 1095.)—*B.* Allied to last, with green bill ; nareal orifices oval and minute ; no expanded and papillose naked space surrounding the eyes. 2, *Z. viridirostris*, Jerdon.—*C.* Red bill, and nareal aperture linear ; no papillose skin on the face. 3, *Z. javanicus*, Horsfield, &c., vide *J. A. S.* XI. 1097 ; \* *Piaya erythrorhyncha*, Lesson.—*D.* A fourth section would seem to be constituted by *Z. flavirostris*, Swainson, 'Birds of W. Africa,' *Nat. Libr., Orn.*, VIII, p. 183, and pl. XI. Should it be thought necessary to separate the two first, they should rank under *Melias* of Lesson.

*Taccocua*, Lesson. This will comprehend the species confounded under the "Sirkeer Cuckoo" of Latham. As compared with the preceding, they have a shorter and more compressed bill, approaching nearly in form to that of *Centropus* ; and they further approximate the latter genus in the more than subspinous character of their plumage, and in their ground habits, although their inner hind claw is short and curved. The following are now for the first time distinguished.

1. *T. infuscata*, nobis : probably *Coccyzus chrysogaster* of Royle's list of birds from the vicinity of Saharanpore. At least two species of this group are indicated in Latham's description of his *Sirkeer Cuckoo* (*Gen. Hist.* III, 267), the present being that first noticed by him, and being characterized by its larger size and infuscated colouring. "Length nineteen inches at least : \* \* \* plumage on the upper parts dusky, with a tinge of purple."—The specimen before me agrees with others which I have seen from the Himalaya, and measures nineteen inches in total length, the tail ten inches, its outermost feathers three inches and a half less ; wing six and a half ; tarse an inch and five-eighths. Bill (as in the others) bright cherry-red at base, yellow at the tip, with a triangular black spot on each side of the upper mandible : feet dusky-leadene, browner on the tarse. In all three species, the upper parts may be described as brown, washed with dusky-green, the feathers having shining black shafts ; but in the Himalayan bird,

\* This species has the somewhat firmer tail of a true *Phœnicophaus*.

scarcely a trace of the brown is visible; lower parts paler, slightly washed with ferruginous on the fore-neck and breast, the belly and lower portion of the tibial plumes deep ferruginous, of a much darker shade than in the other species: tail with all but its middle pair of feathers broadly tipped with white, as in both the others. Peculiar, I suspect, to the sub-Himalayan region.

2. *T. sirkee*; *Centropus sirkee*, Hardwicke and Gray: *C. cuculoides*, Smith and Pearson, *J. A. S. X*, 659. This is probably that, next mentioned by Latham as figured in a drawing; and it is of course the Cawnpore species subsequently noticed by him as weighing "four ounces eight drachms." I believe it also to be that figured by Hardwicke, and referred to by Latham as weighing but "three ounces six drachms and a half;" a difference from the preceding which might depend upon condition, and to a certain extent on sex, these birds being often extremely fat. Describing from Hardwicke's drawing, Latham gives the two middle tail-feathers as "eight inches in length," but from the published copy of the same drawing, I should say that they were nearly ten inches. A fine specimen before me (from Cawnpore) measures seventeen inches in length, the tail nine and a half, its outermost feathers three and three-quarters less; wing six inches; and tarse an inch and a half. Upper parts much paler and more brown than in the preceding species, having scarcely a trace of the green; below paler ferruginous, more generally and uniformly diffused on the belly, flanks, and tibial plumes, and tinging much more deeply the fore-neck and breast. Mr. C. W. Smith describes the upper parts as being of a brownish satin colour, a term which does not convey a very definite idea in the absence of a specimen, but which is nevertheless sufficiently recognisable when the bird is under examination: the hue is lighter and more rufescent than in the next species. Hab. Bengal.

3. *T. Leschenaultii*, Lesson: *Zanclotomus sirkee*, apud Jerdon. Distinguished by its inferior size, and generally more or less ashy fore-neck and breast, and whitish throat; the ferruginous colour of the belly is scarcely so deep as in the last, and there appears always to be a marked distinction of hue between the breast and belly, although the former is more or less tinged with ferruginous; whereas in the Bengal species there is no such marked distinction of hue, the fore-neck and breast being concolorous with the belly, or very nearly so, shading im-

perceptibly from one to the other. In the hue of its upper parts, this species is intermediate to the two others, but approaches nearer to the Bengal one. Its entire head has often a distinct ashy cast, not seen in the others. Length fifteen or sixteen inches, the tail eight or nine inches, its outermost feather three inches and a half less; wing five and a half to six inches; tarse an inch and five-eighths, but considerably less robust than that of *T. infuscata*. Inhabits the peninsula of India.\*

*Centropus*, Illiger. The variations of plumage exhibited by the birds of this genus are very remarkable, and appear oftentimes to be independent of age or sex. Having ascertained the identity of my *C. dimidiatus*, *J. A. S.* XII, 945, with *C. lepidus*, Horsfield, but which species will bear the prior name of *C. Lathamii*, (Shaw), I was subsequently led to suspect that *C. sinensis*, (Shaw), *J. A. S.* XII, 247, might prove to be analogously identical with *C. philippensis*; notwithstanding the great difference of plumage in both cases; and upon more minutely examining the Society's Chusan specimen of *C. sinensis*, I found, on turning aside the feathers of the nape, some glossy steel-black ones just put forth, different in texture from the old plumage, and exactly according with those of ordinary adult *philippensis*; moreover, the two entirely correspond in size and proportion, and I feel now perfectly satisfied of their being one and the same.

In my description of *C. philippensis*, *J. A. S.* XI. 1099, it was mentioned that some of the young birds, in their first or nest dress, were throughout unbarred, being coloured much as in the ordinary adult, except that the rufous is less bright and is deeply infuscated upon the back, while most others of the same age are conspicuously barred throughout, as in a young Cuckoo. In general, these moult into the usual adult dress, figured by Horsfield as *C. bubutus*; but some would appear to assume a peculiar second dress (in which state it is *C. sinensis*), analogous to that of ordinary occurrence in *C. Lathamii*, and which seems likewise to be analogous to the *hepaticus* plumage of *Cuculus canorus*, more frequent in *Cuc. poliocephalus* (*v. himalayanus*,

\* These three species of *Taccocua* appear more decidedly distinct, when seen together, than perhaps would be inferred from the above descriptions: some might deem them local varieties merely of the same, in which case intermediate specimens should occur in intermediate districts; but even then races so nearly allied might perhaps have intermingled, like *Coracias indica* and *C. affinis*; but to me they certainly appear as distinct as *Alcedo grandis*, *A. ispida*, and *A. bengalensis*.

Vigors), in *Cuc. tenuirostris*, Gray, and its Malayan near ally, *Cuc. merulinus* (v. *flavus*). Raffles was aware of this variation of plumage in *Centr. Lathamii*, which he identifies with *Cuculus tolu*, Auct., (a Madagascar species, or more probably variety of several alleged African species, all of about the same size, as *Centr. maurus*, *C. rufus*, and *C. senegalensis*, Auct.,) which it undoubtedly makes a near approach to in the instance of some specimens; but he certainly reverses the order of progression in the states of plumage, in his remarks upon the latter, cited in *J. A. S.* XI, 1103. One young specimen, in undoubted nestling garb, I have described in XII, 945 (at the end of the footnote); the second dress (probably more frequent in the female sex) in XI, 1003; and the fully mature plumage as *C. dimidiatus*, together with the notice of the young: in a fine series now before me, from Bengal (vicinity of Calcutta), Cuttack, and Malasia, are some intermediate to what I have now specified as the second and third phases, but which were not killed during moult, the feathers themselves appearing as though they had been in process of changing colour; but I think it more likely that they had been put forth thus intermediate: these have the rufous back more infuscated, a greater or less number of the shafts of the feathers yellowish-white, on a black or rufous ground, according to the part, and in one instance many intermixed pale and barred feathers on the under parts, the black bars on some of these being enlarged and more or less tending to blot the entire feather. The *Polophilus Lathamii* of Shaw is decidedly a specimen in this imperfectly mature dress; the thoroughly mature garb differing only from that of *C. philippensis* in the less deeply rufous hue of the mantle and wings, but the species being readily distinguishable by its much smaller size, and the shorter and deeper form of the bill.

Analogous differences present themselves in the *Centr. phasianus* of Australia; and I doubt not in the alleged African species, of several of which I have suggested the identity, having no means of personally investigating the problem. In the Malayan islands, the *Centr. melanops*, *Par. Mus.*, of Lesson's *Traité*, vide *J. A. S.* XII, 946, is probably also to be referred to *C. Lathamii*; and *C. bicolor*, *ibid.*, perhaps to the same, or to *C. philippensis*. A distinct species occurs in *C. viridis*, Scop., Lath., (founded on the *Coucou vert d'Antique* of Sonnerat,) v. *C. affinis*, Horsf., vide *J. A. S.* XIII, 391; and another in *C. bengalensis*, Lath., (founded on the *Lark-heeled Cuckoo* of Brown's



Zoology,\*) v. *C. pumilus*, Lesson, vide XII, 945; but with these two I am unacquainted.

Of the species of *Cuculus*, I have now nothing further to add, than that I feel satisfied of the identity of *C. nasicolor*, Hodgson, *J. A. S.* XII, 943, with the common *C. fugax*: of *C. micropterus*, a particularly fine male has the wing as much as eight inches and a quarter long, and the rest in proportion; while of *C. canorus*, an equally fine male has the wing fully nine inches long; the general characters of the two birds, however, rendering them easy of distinction: of *C. Sonneratii* (v. *pravatus*, Horsf., v. *rufovittatus*, Drapiez), a specimen in nestling dress is altogether more coarsely barred than the adult, with pale rufescent upon a black ground above, the under parts white banded with dusky, and having the cross bars broader than in the mature plumage; bill but fifteen-sixteenths of an inch to gape, but the general resemblance to the adult still sufficient to indicate the species at a glance, the half-feathered tarse helping to characterize it apart from *C. tenuirostris* and *C. merulinus*: lastly, of *Eudynamys*, besides the Australian Coël, which was identified with that of India and the Malay countries by Messrs. Vigors and Horsfield, but which Mr. Swainson has separated (on account of its considerably larger size,) as *Eu. australis*, the *Cuc. taitensis*, Sparrman, of New Zealand and the South Sea Islands, is referred to this genus by Mr. G. R. Gray, (vide Appendix to Dr. Dieffenbach's 'New Zealand,' Vol. II, 193).

*Caprimulgidæ*. Three allied species of this tribe appear to have been lately confounded under the name *Caprimulgus macrurus*, Horsfield. These are—

1. *C. albonotatus*, Tickell, *J. A. S.* II., 580: *C. gangeticus*, nobis, mentioned in *An. and Mag. Nat. Hist.* 1843, p. 95; regarded as distinct from *macrurus*, Horsfield, in *J. A. S.* XII, 178 (*bis*),—but referred to *macrurus* in XI., 586, an identification in which Dr. Horsfield coincided. The size, however, of *C. macrurus* of Java is considerably smaller; and there is a closely allied species in Southern India, which, agreeing better in dimensions with the Javanese bird, I therefore presumed might be identical with the latter. Mr. Jerdon, who has treated critically of the Indian species of this genus in the

\* On the same plate is figured a "Spotted Curucui" from Ceylon, which is evidently the *Cuculus (Chrysococcyx) lucidus*.



second No. of his 'Illustrations of Indian Ornithology,' provisionally assented to this suggestion; but with proper distrust, "in a genus where the plumage is so very similar," remarked that the bird of Southern India might yet prove to be distinct, in which case he proposed for it the specific name *atripennis*: Mr. Strickland, however, has informed me that he had lately received from Mr. Jerdon "a specimen of his small *C. macrurus* from the Neilgherries, which evidently seems to be the same as Horsfield's *macrurus*"; yet it does not appear that the latter naturalist actually compared the two together, and the Society has now a distinct Malacca species which I feel very confident will prove to be the true *macrurus* of Horsfield, and I as little doubt that the species of Southern India is *C. mahrattensis* of Sykes. That immediately under consideration is acknowledged by Mr. Strickland to be quite distinct, and this naturalist has suggested for it the felicitous name *gagateus*, "from its rich agate-like markings:" of its identity, however, with the species named as above by Captain Tickell, I feel no doubt, although the statement of that observer that the sexes are alike, does not fully apply. It is a common bird in Lower Bengal during the cold season, and appears to be generally diffused throughout Northern India, but it has not been met with in the southern part of the country, where it would seem to be replaced by the next. A fine male of *C. albonotatus* measured thirteen inches long, by twenty-five in spread of wing; the closed wing nine inches, and tail seven inches: a small female eleven and a half, by twenty-one inches; wing eight and three-eighths, and tail six and five-eighths. The tarse (as in the others,) is anteriorly feathered nearly to the toes. This bird has the crown and tertiaries light cinerascens, minutely mottled, and marked with a stripe of black dashes along the middle of the crown: upper range of scapularies black, more developed in the male, and bordered, more broadly externally, with rufescent-white: lores and ear-coverts brown: wing-coverts black, mottled with rufous, and largely tipped with rufescent-white: a broad white patch in front of the neck, as in several allied species: there is a band of white on the primaries, contracted and rufescent in the female; and the two outer tail-feathers are broadly tipped with white in the male, and much less broadly tipped with slightly mottled pale rufescent in the female. Altogether the females are much paler, and browner or less ashy, than the other

sex. The rictorial bristles are conspicuously white at base, and black for the remainder of their length.

2. *C. mahrattensis*, Sykes, *Proc. Zool. Soc.* 1832, p. 83: *C. macrurus* apud Jerdon, *Ill. Ind. Orn.* (vide his description of *C. indicus*). Very similar to the last, but much smaller; a male now before me having the wing but six inches and a half in length, and tail four and three-quarters: in another the wing measured seven inches, and the tail five; but Mr. Jerdon assigns "about seven inches and a half" as the length of the wing, and "five and a half to six inches," as that of the tail. He adds, that he considers it may perhaps be the *C. asiaticus*, var., of Latham. In the only specimen before me, there is a russet tinge about the nape, back, and breast, not seen in the preceding species. Formerly, I regarded what Mr. Jerdon pronounces to be a mere pale individual variety of the variable *C. indicus*, as Sykes's *mahrattensis*; but looking more attentively to the description of the latter, the statement that the two outer tail-feathers are tipped with white, cannot refer to any variety of *C. indicus*, wherein the four outer tail-feathers (or all but the middle pair,) have subterminal white tips, the extremities being always dark. In other respects, I conceive that Sykes's description will apply sufficiently to the generality of specimens; particularly as he states that it "differs from *C. monticolus* and *C. asiaticus*, in the prevalent greyness of the plumage, and in the absence of the subrufous collar on the nape." Hab. Southern India.

3. *C. macrurus*, Horsfield, *Lin. Trans.* XIII, 142. To this I refer two Malacca males, and two Arracan females, in the Society's collection, which are intermediate in size to the two preceding, and are further distinguished by their much darker general colouring, and the males by having the primaries black to the end, instead of being mottled towards their tips. Wing seven inches and three-quarters in the males, and tail six inches: in the females, the wing measures seven and a half, and tail five and three-quarters: the males have the crown and nape dark brownish-ashy, minutely mottled, with black dashes along the middle of the crown, as in the preceding species, and the scapularies and wings are similarly marked with black, set off with bright rufous-white, the margins so coloured being narrower than in the others: breast and fore-part of the belly dark, and contrasting strongly with the light buffy tint of the hind-part of the belly, vent, and lower tail-coverts, which last tend to be whitish in one specimen, barred with

black: the primaries underneath have no rufous bars whatever, or mottlings either at base or tip, and these are but imperfectly developed towards the base of the tail underneath: but the white spots on the middle of the primaries, and largely tipping the two outer tail-feathers, are the same as in the others. There is also the same conspicuous white mark in front of the neck, which is represented by pale buff in the female. The latter is altogether browner and less ashy, particularly on the head and neck; but is still considerably darker than the *males* of the other species; the contrast of the dark breast and pale belly and vent is much less decided; the primaries are barred at base with rufous, and slightly so towards the tip, the white of the male being represented by a contracted rufous bar; and the two outer tail-feathers are also much more narrowly tipped, with rufescent instead of pure white. On comparison of these three species together, particularly with a good series of specimens, it is impossible not to regard them as distinct, however nearly allied.

The other Indian species are—

4. *C. asiaticus*, Lath.; *C. pectoralis*, Cuv., Levaillant, *Ois. d'Afr.*, pl. XLIX, apud *Dict. Class.*; *Bombay Goatsucker*, Latham. This small, common, and generally diffused species over the country, is allied in colouring to the three last, but has the tarse bare, and the sexes are alike in plumage. Mr Jerdon is “still inclined to believe that the species figured by Hardwicke and Gray as *asiaticus*, differs from the common kind. I obtained,” he adds, “what answers to this very closely in the north of the Deccan. It differs from the common one in its larger size, more prevalent and lighter grey tint of the plumage, and in some other trifling points; but I have now no specimens for comparison.” Could this have been *C. mahrattensis*? I certainly think there can be little doubt that Hardwicke’s figure was taken from a Bengal specimen, and is meant to represent the common species. *C. affinis*, Horsfield, is a Javanese species allied to the present one, and this and *macrurus* are the only kinds noticed in Dr. Horsfield’s list of the birds of Java; while, in Sumatra, Sir Stamford Raffles also speaks of but “two varieties, one with much brighter and more marked colours than the other. They are very abundant in the neighbourhood of Bencoolen.” Different species of *Lyncornis*, as well as of *Batrachostomus*, are however common in the vicinity of the Straits, and the former of these would have been classed by Raffles in *Caprimulgus*.

5. *C. indicus*, Lath., Jerdon : *C. cinerascens*, Vieillot. This handsome species appears subject to considerable variation, in its dimensions, depth of colouring, greater or less development of the black on its upper-parts and inversely of the fulvescent-white upon the scapularies, wing-coverts, &c., and also in the amount of the rufous barring upon the primaries, which I think is generally less developed in the smaller specimens of both sexes : its tarse is feathered ; and all the caudal feathers of the male, except the middle pair, have a white spot near the tip, which in the female is scarcely indicated. In general, these white spots have only a slight dark margin, tipping the feather ; but in one variety before me, with wings as much as eight inches and a half long, the white on the tail-feathers is somewhat contracted in quantity, and has a dark border fully half an inch in breadth, tipping each feather\*. This species is, I think, commonest in the sub-Himalayan region, but it extends sparingly over India generally, and I have once known it to be shot in the neighbourhood of Calcutta.

6. *C. monticolus*, Franklin : *Great Bombay Goatsucker*, Latham. In this the male is distinguished by having its two outer tail-feathers on each side wholly white, to near the tip, whereas in the female these are barred throughout rufous and black. The female is also paler than the male ; and both sexes are, throughout, more uniformly, minutely mottled ashy, than in either of the other species, this plainness of colouring being relieved by the pale rufescent hue of the borders of the middle scapularies, by a white throat-band in the male, considerably less bright and contrasting in the female, and by the white on the primaries and tail of the former. With *C. asiaticus* it accords in having the tarse naked, and a sort of collar surrounding the neck. I have twice obtained it near Calcutta, and it appears to be sparingly diffused throughout the country from the Himalaya southward ; Capt. Abbott has also sent it from Arracan.

\* The specimen here adverted to is probably not Indian, but from the eastward ; and may prove to be of a distinct species : and *one* Neilgherry specimen forwarded by Mr. Jerdon has also much the appearance of being distinct ; in this, the ashy portion of the plumage is much more albescent than usual, contrasting strongly with the black, and there is scarcely a trace of rufous, except some broken bars of this colour at the base of the primaries ; a row of whitish spots bordering the scapularies shew very conspicuously ; the white spots on the tail-feathers are larger than usual ; and the wing measures but seven inches and a quarter long : it is a remarkably handsome bird.



That very beautiful bird, the *Lyncornis cerviniceps* of Gould, extends so high as Arracan, where it is not very uncommon; and the Society also possesses *L. Temminckii* from Singapore. *Bombycistoma Fullartonii*, Hay, *J. A. S. X*, 573, is identical with *Batrachostomus auritus*, (V. and H.), Gould, which name it must bear; and with respect to the supposed *Podargus* (or rather *Batrachostomus*) *javensis* of Coorg, in southern India, noticed in XI, 798, Mr. Jerdon has since informed me that "it is not that species, but a smaller one, about eight or nine inches long; of which," he remarks, "I have seen a Malacca specimen. It is, I think, distinguished in Lesson's '*Manuel d'Ornithologie*,' which I do not possess. I can perfectly trust to the descriptions I received of it, and hope yet to obtain specimens." Most probably it is the *Podargus* (now *Batrachostomus*) *stellatus*, Gould, *Proc. Zool. Soc.* 1837, p. 43, which, together with *Bat. auritus* and *B. javensis* (v. *Podargus cornutus*, Tem.), inhabits the Malay peninsula.

*Cypselidæ*. Swifts. To Mr. G. R. Gray is due the credit of first separating the *Hirundo esculenta*, Lin., (the constructor of the celebrated edible birds'-nests,) from the group of Swallows, and transferring it, as a new and distinct generic type, *Collocalia*, to that of the Swifts: and I can now announce a second representative of this type in the *Hirundo unicolor* of Jerdon, since regarded by him as a *Cypselus*, upon which I altered the specific name to *concolor* (*J. A. S. XI*, 886), as there was previously a *Cypselus unicolor*; but it must now rank as *Collocalia unicolor*, (Jerdon). From the true Swifts (*Cypselus*), the species of *Collocalia* differ in their considerably less robust general conformation, in their comparatively very slender tarsus and toes, and in having the hind-toe distinctly opposed to the three anterior toes. Mr. Jerdon "only found this remarkable species in the Neilgherries, and about the edges of the hills. It flies in large flocks, and with very great speed." The Society has also received it from Darjeeling. Is it, therefore, exclusively a mountain species, which constructs glutinous nests like the other, but in mountain caverns? Or does it resort, like its congener, to the caverns of cliffs overhanging the sea-shore during the breeding season, in this case being perhaps the constructor of the edible nests which are found on the western coast of the peninsula of India, as, for instance, in the group of small islands about eight miles west of Vingorla (which is 275 miles from Bombay), commonly known as the Vingorla rocks, where about a hundred-



weight of these nests are produced annually? To myself, who, long ago, following the accounts of the edible nests being constructed by a true *Hirundo*, found this a stumbling block to one of the distinctions which I drew between the Swallows and the Swifts, I confess it yielded some gratification to find my suspicions in this matter completely confirmed; for the nest of *Cypselus apus* of Europe is essentially similar to that of *Collocalia esculenta*, containing a large quantity of glutinous matter, which there can be no doubt is secreted by the very large salivary glands of the bird\*; whereas in *Hirundo urbica*, the nests of which species might be thought to present a marked analogy, the fabric is constructed of mud, or, as Vieillot remarks, worm-casts are selected for the purpose, and the birds may be commonly seen on the ground collecting material of the kind, many of them often resorting to the same wet place,—the Swifts, on the contrary, never descending to the ground at all. The two groups of Swallows and Swifts present a very remarkable instance of what is termed *analogy*, or mere external and superficial resemblance, as opposed to *affinity*, or intrinsic physiological proximity. Though externally resembling in their *adaptive characters*, as a Cetal may be said to present a superficial resemblance to a fish, sufficient indeed to have occasioned the group to be still popularly classed with fishes, the difference between the Swifts and Swallows is analogous in kind, but inferior in degree, to that which necessitates the Whales and Porpoises to be removed altogether from among fishes: and the same intrinsic similarity in the essential structure, which compels us to arrange the Cetals in the class of mammalia, equally approximates the Swifts to the *Trochilidæ* (or American Humming-birds), while the Swallow conformation is modelled on the ordinary passerine type, from which it deviates only in external modifications, having reference to mode of life. In the Swift, as in the Humming bird, the entire structure, alike as regards the rudimental anatomy and the external characters, concurs to produce the maximum of volar power; whereas in the Swallows there is no such general concurrence, but the potency of flight seems entirely due to the development of the wings and tail, the sternal apparatus in no respect differing from that

\* Vide *Mag. Nat. Hist.* 1834, p. 463 *et seq.* The nests there described passed into my possession, which enables me to state that the glutinous matter was in greater quantity than would appear from the account given by Mr. Salmon. The fact is, it constitutes the basis of a Swift's nest, by which is made to adhere the various light substances gathered in the air by these birds, when such are blown about on a windy day.

of a Sparrow, or a Robin, but retaining the peculiar configuration observable throughout the passerine type, in all its integrity. It would be out of place here to pass in review the principal details of conformation of the groups to which the Swifts and Swallows respectively belong, and to shew how essentially they differ in the whole skeleton, in the alimentary organs, that of voice, &c. ; even to the structure of the feathers, and to the circumstance that the Swifts (like the *Trochilidæ* and *Caprimulgidæ*.) have never more than ten *rectrices*, while the Swallows have twelve, in common with the whole of the grand series of passerine birds, save one or two peculiar exceptions, of which the Drongo (or King-Crow) group is the most remarkable one. I shall conclude for the present by indicating the Indian species of *Cypselidæ*.

These fall under four generic heads.

*Acanthylis*, Boie, v. *Chætura*, Stephens : from which *Pallene* of Lesson, containing the Indian species, is placed separately by Mr. Gray, for reasons with which I am unacquainted. Mr. Hodgson, also, says of the Himalayan species, that it is "certainly not a *Chætura* as defined by Stephens. I have set it down in my note book," he adds, "as the type of a new genus, called *Hirundapus*," (a bad hybrid name, which holds priority over *Pallene*). Mr. Swainson, however, had long previously figured the same bird as a true *Chætura*, from which genus I cannot perceive in what it differs.

1. *Ac. gigantea*, (Tem.) Inhabits the Malay countries, extending northward to Arracan, where it is of rare occurrence ; it also occurs in the Neilgherries. Chin albescent, but not forming with the throat a large pure white patch, as in the next species ; and the spinous tail-feathers are much stouter, with their webs tapering, and not terminating abruptly as in the other.

2. *Ac. caudacuta*,\* (Lath.): *Hirundo fusca*, Shaw ; *Chætura australis*, Stephens ; *Ch. macroptera*, Swainson ; *Ch. nudipes*, Hodgson, *J. A. S.* v. 779 ; *Cypselus leuconotus*, *Mag. de Zool.* 1840, *Ois.*, pl. XX, and figured in the *Souvenirs*, &c. of M. Adolphé Delessert, pt. II, pl. 1X,

\* The Himalayan bird is certainly the *macroptera* of Swainson ; and as this is given as a synonym of Latham's *caudacuta* by Mr. Strickland, (*An. and Mag. N. H.* 1843, p. 337,) on the authority of the drawing upon which Latham founded his description, now in the possession of the Earl of Derby, I of course bow to the decision of that naturalist ; though Latham's statement that it has the "forehead white, and throat very pale dusky," certainly applies better to *Ac. gigantea* of the Malay countries.

p. 25. Himalayan ; and said to be the same as the Australian species, though I question if specimens have ever been actually compared.

*Cypselus*, Illiger. Ordinary Swifts.

1. *C. melba*, (L.): *C. alpinus*, Tem. Neilgherries, Travancore, &c. ; also Southern Europe.

2. *C. pacificus* (? Lath.): *C. australis* (?), Gould, *Proc. Zool. Soc.* 1839, p. 146 ; vide *J. A. S.* xi, 886. Penang.

3. *C. leuconyx*, nobis. Closely allied to the last, and described from a Deccan specimen in *J. A. S.* xi, 886 : a Calcutta specimen (being the only one which I have yet heard of) flew into the window of a house in Garden Reach, and was obligingly presented to the Society by Willis Earle, Esq. It minutely agrees with my description of the other, except that the wing is a quarter of an inch longer. The marked difference in size of foot from the preceding species forbids their being considered of one kind.\*

4. *C. affinis*, Gray, Hardwicke's *Ill. Ind. Zool* : *C. nipalensis*, Hodgson, *J. A. S.* v. 780. India generally ; very common about Calcutta.

5. *C. palmarum*, Gray, *ibid.* India generally ; common.

*Collocalia*, G. R. Gray.

1. *C. unicolor*, (Jerdon): *Cypselus concolor*, nobis, *J. A. S.* xi, 886. Darjeeling ; Neilgherries.

2. *C. esculenta*, (Lin.) Malay coasts : common in the Nicobar islands ; and Captain Phayre informs me that "it is to be had on the rocky islands off the southern part of the coast of Arracan:" it also (or possibly the preceding species, vide p. 210,) breeds along the Malabar coast, and so far northward as the Vingorla rocks.

*Macropteryx*, Swainson.

*M. klecho*, (Raffles): *Cypselus longipennis*, Tem. Central and Southern India, and Malay countries.

Mr. Swainson gives, as a second species, the Sumatran *Cypselus comatus*, Tem., which I have not seen ; and as a third, *C. mystaceus*, (Lesson,) who applies the name *Pallestre* to the genus.

July 12th, 1845.

E. B.

\* There is a *Cypselus vittatus*, from China, figured in the 2nd series of Jardine and Selby's 'Illustrations of Ornithology,' which I believe is allied to *C. pacificus* (?) and *C. leuconyx* ; but it has the tail forked to the depth of an inch.

*Observations on the rate of Evaporation on the Open Sea ; with a description of an Instrument used for indicating its amount. By T. W. LAIDLEY, Esq.*

It has often occurred to me, that a simple and convenient instrument for ascertaining the actual amount of exhalation from a humid surface, could not fail of being essentially serviceable to meteorological science, as well as to the arts. An instrument for this purpose was indeed contrived by the late Professor Leslie, to which he gave the name *Atmometer*: but though very ingenious, and fulfilling tolerably well the intentions of the inventor, it fails in a very important qualification of scientific instruments, simplicity of construction and use ; and is consequently less frequently employed in observing the condition of the atmosphere in reference to dryness and humidity than is desirable. The instrument is thus described by its inventor : “ The *Atmometer* consists of a thin ball of porous earthenware, two or three inches in diameter, with a small neck, to which is firmly cemented a long and rather wide glass tube, bearing divisions, each of them corresponding to an internal annular section, equal to a film of liquid that would cover the outer surface of the ball to the thickness of the thousandth part of an inch. The divisions are marked by portions of quicksilver introduced, ascertained by a simple calculation, and they are numbered downwards to the extent of 100 to 200 ; to the top of the tube is fitted a brass cap, having a collar of leather, and which after the cavity has been filled with distilled water, is screwed tight. The outside of the ball being now wiped dry, the instrument is suspended out of doors, exposed to the free access of the air. In this state of action the humidity transudes through the porous substance just as fast as it evaporates from the external surface ; and this waste is measured by the corresponding descent of water in the stem. If the *Atmometer* had its ball perfectly screened from the agitation of the wind, its indications would be proportional to the dryness of the air at the lowered temperature of the humid surface ; and the quantity of evaporation every hour as expressed in thousand parts of an inch, would when multiplied by 20 give the hygrometric measure. The *Atmometer* is an instrument evidently of extensive application, and of great utility in practice. To ascertain with accuracy and readiness the quantity of evaporation from any



surface in a given time, is an important acquisition, not only in meteorology, but in agriculture and in the various arts and manufactures. The rate of exhalation from the surface of the ground is scarcely of less consequence than the fall of rain, and a knowledge of it might often direct the farmer advantageously in his operations. On the rapid dispersion of moisture depends the efficacy of drying houses, which are often constructed most unskilfully, or on very mistaken principles."

The instrument which I have found to answer extremely well, consists of a glass tube the bore of which must be equable, and may vary from one or two-tenths of an inch in diameter to a much larger size, according to the pleasure of the constructor. If the bore be not quite equable, its varying capacity must be ascertained and allowed for on the scale to which it is to be attached. One end of this tube, after being ground quite flat and smooth, is to be closed with a porous substance, which space permits the free transudation of water, but yet not so freely as to accumulate in drops or to fall. I find that common cedar wood possesses the requisite quality, and forms a plug which swells so as to become water-tight; and by its porous structure permits the fluid to permeate as rapidly as the atmosphere removes it from the exposed surface. The tube thus prepared, and filled with distilled water, is to be attached to a scale divided into fiftieths or hundredths of an inch, upon which as the evaporation proceeds and the column of fluid descends, the daily amount of evaporation may be conveniently observed. No other precaution seems necessary in using this Atmometer than to supply it with *very pure* rain or distilled water; for any saline matter it might contain would be deposited upon the evaporating surface, and would interfere very materially with the result. To prevent error from this source, the entire tube should be very frequently (say every time that it is filled,) washed in a quantity of clean water to remove accidental impurities; and the cedar plug occasionally renewed.

The following observations made with this instrument on board of the ship "Southampton," on her recent voyage from England to Calcutta, showing the rate of evaporation on the open sea in tropical latitudes, may not be altogether uninteresting to such as are curious in oceanic meteorology. The instrument was suspended in a shaded part of the vessel, exposed freely to the action of the wind.



		Latitude.	Longitude.	Barometer.	Thermometer.	Evaporation in inches.	
		° /	° /		°		
October	3	37 15 S	40 31 E	29.90	62	0.40	
	4	37 13	41 05	30.13	63	0.38	
	5	37 19	47 50	30.10	64	0.51	
	6	37 09	51 51	30.05	66	0.33	
	7	36 38	56 14	30.08	56	0.40	
	8	35 58	59 50	30.12	58	0.45	
	9	35 39	62 21	30.16	61	0.40	
	10	34 46	67 19	30.14	62	0.40	
	11	33 24	71 47	30.02	63	0.41	
	12	31 51	76 04	29.94	63	0.35	
	13	30 27	79 05	30.09	66	0.38	
	14	28 54	82 37	30.16	69.5	0.37	
	15	26 14	84 25	30.18	71	0.39	
	16	24 25	86 10	30.19	71.5	0.60	
	17	23 02	86 14	30.24	72	0.62	
	18	21 06	86 18	30.10	73	0.72	
	19	18 25	86 34	30.11	76	0.68	
	20	16 39	86 36	30.10	77.5	0.70	
	21	14 42	86 54	30.11	81	0.70	
	22	11 07	86 54	30.00	82	0.78	
	23	7 39	86 34	30.09	84	0.80	
	24	3 57	87 10	30.05	84.5	0.82	
	25	2 08	87 19	30.04	83.5	0.75	
	26	1 09 N	87 57	29.97	84	0.86	
	27	4 19	89 32	30.00	82.5	0.98	
	28	6 41	90 16	30.00	84	1.00	
	29	7 58	90 40	30.00	84.5	1.06	
	30	8 50	90 52	30.02	81.5	0.88	
	31	9 35	90 40	30.00	84	0.72	
	November	1	10 55	90 15	30 00	84	0.93
		2	13 10	89 56	30.03	81	0.82
3		14 15	90 00	30.05	86	0.40	
4		15 20	89 30	30.05	84	0.70	
5		17 25	88 49	30.00	83	0.67	
6		18 34	88 24	30.00	83	0.72	
7		18 52	88 45	30.02	83	0.68	
8		19 23	88 53	30.10	83	0.88	
9		19 18	89 37	30.00	82	1.15	
10		19 56	89 43	30.00	82	1.25	
11		20 37	89 00	30.00	81	1.24	
12		20 54	89 12	29.95	80	1.32	
13		Sandheads.		29.98	80	1.04	

The reader will perhaps be surprised at this high rate of evaporation on the open sea, differing as it does so widely from that deduced by M. Von Humboldt from his own observations with the hair hygrometer. That accomplished observer gives the following results, calculated from a formula of M. d' Aubuisson, which does not however appear to meet all the circumstances of the case.

Latitude N.	Thermometer, (Cent. grade.)	Hygrometer.	Quantity of water evaporated per hour in millimetres.
° /		°	
39 10	14.5	82	0.13
30 36	20.0	85 7	0.14
29 18	20.0	83.8	0.16
18 53	21.2	81.5	0.20
16 19	22.5	88	0.13
12 34	24.0	89	0.13
10 46	25.4	90	0.12
11 1	25.0	92	0.09

“It follows from these researches,” says M. Von Humboldt, “that if the quantity of vapour which the air commonly contains in our middle latitudes, amounts to about three-quarters of the quantity necessary for its saturation, in the torrid zone this quantity is raised to nine-tenths. The exact ratio is from 0.78 to 0.88. It is this great humidity of the air under the tropics, which is the cause that the evaporation is less than we should have supposed it to be from the elevation of the temperature.”

These inferences seem scarcely compatible with the actual indications of my instrument. But it must be observed, that besides being imperfect as a hygroscope, De Luc's instrument takes no cognizance of the important agency of the wind in promoting evaporation. So far from diminishing, the exhalation from the surface of the sea would appear to augment very rapidly as we approach the torrid zone: my observations exhibiting a daily average of 0.398 in. from latitude 37° 15' S. to latitude 24° 25', and of 0.809 in. through the tropics.

*On the Alpine Glacier, Iceberg, Diluvial and Wave Translation Theories ; with reference to the deposits of Southern India, its furrowed and striated Rocks, and Rock basins. By CAPTAIN NEWBOLD, M. N. I., F.R.S. Assist. Commissioner Kurnool, Madras Territory. With a plate.*

The geological reader in looking over the published remarks of observers on the geology of Southern India, can hardly fail being struck with the almost utter absence of any notice of a boulder or drift formation, analogous to that which prevails to a great extent over the surface of the northern parts of Europe, and in the higher latitudes of the opposite hemisphere. Nor has any undoubted testimony been hitherto laid before the geological world as to the existence in Southern India of the polished surfaces of rocks, grooves, parallel striæ, perched blocks, truncated conical mounds, tumuli, and long ridges of gravel, which have been so conspicuously pointed to in Europe by Agassiz and others, as unquestionable evidences of the overland march of glaciers conveying boulders, gravel, sand, and loam to great distances.

Charpentier and Venetz were the first, I believe, to promulgate the theory—that ancient Alpine glaciers extended far beyond the present limits of glaciers from the Alps to the Jura, and were the means of conveying the gigantic angular granite and crystalline blocks of the former chain, to the strange position they now occupy on the limestone slopes of the latter ridge, over the intervening valley, which is one of the deepest in the world and upwards of 50 miles in width. To account for the extension of glaciers across this valley to the Jura, now entirely destitute of glaciers, M. Charpentier supposes the elevation of the Alps to have been much greater than now: and it appears certain that moraines, striæ, and furrows, considered to be indubitable marks of glacial action, can be traced in the Alps to great heights above the present glaciers, and to great horizontal distances beyond their lower limits. The Jura, which is only about one-third of the average height of the Alps, presents similar marks of glacial action to the Alps, although now entirely destitute of glaciers.

It was subsequently objected, that the phenomena of erratic boulders extend over the northern and more temperate zones of Europe, Asia and America, in flat tracts, and consequently could not be ac-

counted for by so local a cause as the former greater elevation of the Alps.

To explain these difficulties, M. Agassiz repudiates the former greater elevation theory; and supposes a former colder state of climate prevailing over the countries, in which the phenomena of boulders are found, and which covered them, as is now the case in Greenland, with sheets of ice and glaciers.

He supposes that most of the large longitudinal beds of unstratified gravel we see in the North and West of England, Scotland and Ireland, to be the lateral moraines, and the conical truncated mounds and insulated tumuli to be the terminal moraines of ancient glaciers, (left by their retreat, and not pushed forward by them as supposed by Charpentier,) broken and washed by *debâcles* occasioned by the thawing of the ice, masses of which were thus drifted in diverging directions, conveying the large insulated angular masses of rock called erratic blocks to the strange situations we now see them occupying.

Circles of such angular blocks seen round the summits of conical peaks are supposed to be occasioned by the glaciers lodging on it and melting on it. They are usually called perched blocks.

The rounded or bouldered blocks and gravel are supposed to have been produced by the trituration of the masses of ice and glaciers upon the subjacent surface, and the angular blocks which are found on the surface of the rounded materials, to have been left there by the melting of the ice. The interstratified deposits of mud, gravel and sand are considered to be a re-arrangement of the smaller materials of a moraine produced by the water resulting from the melting of a glacier. M. Agassiz observed polished surfaces, furrows, cavities, and striæ in the rocks of England, &c. where the boulder formation exists, similar to those in the Alps, and considers them also as proofs of the former existence of glaciers in those now temperate regions.

The longitudinal furrows, &c. were observed by Seffström and others to have a general direction of N. W. and S. E. in the rocks of Lapland, Norway, and Sweden; which, added to the circumstance of blocks of granite confessedly from the mountains of Scandinavia being found imbedded in the boulder and drift of the eastern coast of England and Scotland, over Russia and Germany to the borders of Holland, and other reasons, induced many distinguished geologists to suppose the

boulder deposit to have been produced by a deluge, or great oceanic wave from the north. These parallel furrows were supposed to have been caused by the passage of gravel propelled by this great current, and hence called "diluvial schrammen."

Böttlingk, however, has observed that some of these Scandinavian furrows have centres of dispersion (like those formed by modern glaciers on the Alps,) conformable to the major axis or longitudinal direction of each valley. In the south of Sweden, he says, the striæ incline southerly; but on the east of Lapland northerly to the Icy ocean; he states, the general direction of the striæ on the summits of Scandinavia to be from N. W. to S. E. Those also in North America observed by Professor Hitchcock, have a similar direction.

M. Agassiz repudiates this diluvial theory as applicable to the drift and parallel furrows on the rocks of England and Scotland, which he states to diverge every where from the central chains of the country, following the course of the vallies; and that the distribution of the blocks and gravel follows similar directions, each district often having its peculiar debris traceable in many instances to its parent rock at the head of the valley. Hence, he infers, the cause of the transport must be sought for in the centre of the mountain ranges, and not from a point without the district. The Scandinavian blocks in the drift of England, he confesses, may have been transported on floating ice.

M. Agassiz does not deny the power of water to produce the furrows, and polishing of rocks in *sitû*; but states he has not been able to find them on the borders of rivers, lakes, and on sea coasts; that the effects produced by water are sinuous furrows proportioned to the hardness of rocks; not even, uniform, polished surfaces, such as those presented by rocks acted upon by glaciers having both loose gravel under them, and pebbles and pieces of rock firmly set in their lower surface like teeth in a file, and which are independent of the composition of the stone: for, he states, wherever the moveable materials, which are pressed by the ice on rocks in *sitû*, are hardest, there occur independent of the polish, striæ more or less parallel in the general direction of the movement of the glaciers. Thus, in the neighbourhood of glaciers, are found those polished round bosses which Saussure distinguishes by the name of '*roches moutonnés.*' The most striking fea-



tures in the distribution of Alpine glacial striæ are thus diverging at the outlets of the vallies, and their being oblique and never horizontal on the flanks, which they would be, were they due to the agency of water, or floating masses of ice.

The cause of their obliquity M. Agassiz ascribes to the upward expansion of the ice by the freezing of the water infiltrated into the crevices and pores of the glaciers, and the descending motion of the glacier itself which he considers produced by this expansion of the mass and its gravitation.

From the resemblance in shape, and the interior arrangement of the beds of the so-called diluvium of England, France and Germany, that of the moraines confessedly produced by existing Alpine glaciers ; from the presence on these rocks of furrows, &c. resembling those now produced at the bottom of moving glaciers ; their radiation from mountain centres of elevation and coincidence of direction with that of the vallies down which glaciers would descend ; their obliquity just described, and from the existence on the Jura limestone of basin and funnel-shaped cavities, and small indentations similar to those seen forming at the bottom of glaciers by small and temporary cascades descending through cracks and chasms in the ice, and from the association in those regions of these Alpine phenomena, which M. Agassiz contends are inexplicable on any theory of aqueous action apart from ice ; he infers, as already stated, that very large portions of the now temperate regions of the globe have for a long period been covered with ice and snow.

A few shells of an arctic character, which have been found in the boulder deposits of Scotland and North America in addition to the above, constitute all the evidence we have of the period of intense cold, on which rests the Alpine glacial theory as applicable to the boulder deposits ; and which M. Agassiz ingeniously imagines, accounts for the extinction of the mammoths which flourished in the warm period immediately antecedent, and the appearance of their frozen remains in arctic glaciers. The frozen period was followed by the more temperate human epoch.

The views of M. Agassiz on the origin of the boulder deposit have met with powerful support from Dr. Buckland, and partially from Mr. Lyell.

Mr. Murchison, the late distinguished President of the Geological Society, and M. Vernenil, reject the Alpine glacial theory, considering it as totally inapplicable to the boulder formation overspreading great part of Russia; the large granitic and other crystalline blocks of which (previously alluded to) have attracted so much attention from the days of Pallas up to the present time. These blocks, which have all been evidently derived from the North, are shown to have been deposited *under the sea*, or in other words, *on a sea bottom*, since they cover marine shells of the post-pleiocene period. The smaller blocks of the detritus are in general carried to greater distances than the larger; the distance being sometimes 1000 miles from the parent beds to the N. W. As in the English deposits, although a large proportion consisted of material brought from a distance, yet it contained a considerable portion of the detritus of the subjacent and adjacent rocks, the nature of which was often indicated from the colour of the superficial clay and sand. Mr. Murchison and M. Vernenil observed *no instance of any substance having been transported from S. to N.* except by the modern action of streams, and by local causes dependent on the present configuration of the land.

In room then of the Alpine glacial theory these authors substitute that of Icebergs. *They believe that these great blocks have been transported on floating icebergs set adrift from ancient glaciers supposed to have existed in Lapland and the adjacent tracts; from the northern chains of which the blocks were originally dislodged and impelled southwards into the sea of that period, in which the post-pleiocene shells they are now seen to rest upon were accumulated.*

They did not observe any parallel striæ or polishing of the surfaces of the rocks of Central Russia, but describe the most southerly of the scratches which came under their notice near Petrazowodsk on the Lake Onega.

They consider these marks may have been caused *by the ice-floes and detritus dislodged and set in motion by the elevation of the northern continental masses, grating upon the bottom of the sea*; since, if they were caused by the *overland* march of glaciers, the glaciers must have been propelled from lower to higher levels, which is against what they conceive to be an axiom, viz., *that the advance of every modern glacier depends on the superior altitude of the ground behind it.*

Mr. Darwin's researches in the opposite hemisphere show, that the boulder formation, with all its European features, exists over extensive regions of South America; in the plains traversed by the Rio Santa Cruz (Lat.  $50^{\circ}$  S.); Tierra del Fuego,—including the Straits of Magellan and the Island of Chiloe (Lat.  $43^{\circ}$  S., Long.  $73^{\circ}$  W.) Mr. Darwin, in order to account for the interstratification of regular beds, the occasional appearance of stratification in the mass itself, the juxta-position of rounded and angular fragments of various sizes and kinds of rock derived from distant mountains, and the frequent capping of gravel, follows Mr. Lyell in believing that floating ice charged with foreign matter has been the chief agent in its formation; but, he adds, it is difficult to understand how the first sediment was arranged in horizontal laminæ; and coarse shingle in beds; *while stratification is totally, and often suddenly, wanting in the closely neighbouring till*, if it be supposed that the materials were merely dropped from melting drift ice; and he is disposed to think that the absence of stratification, as well as the curious contortions described in some of the stratified masses, are mainly due to the disturbing action of the icebergs when grounded.

He believes also, that the total absence of organic remains in these deposits may be accounted for by the ploughing up of the bottom by stranded icebergs, and the impossibility of any animal existing on a soft bed of mud or stones under such circumstances. In confirmation of the disturbing action of icebergs, Mr. Darwin refers to Wrangel's remarks on their effects off the coast of Siberia.

Professor Hitchcock, and more recently Mr. Lyell, have made us acquainted with the great extent of the boulder formation in North America accompanied by parallel striæ, and rounded and polished surfaces of the harder rocks in situ; also vast longitudinal mounds and detached tumuli of detritus. The prevailing direction of the striæ observed by the former, as before observed, assimilated to that of the furrows on the Scandinavian rocks, viz., from N. W. to S. E.

The advocates of the iceberg theory consider these ridges and mounds of unstratified gravel (the moraines of the glacialist) to have been the wreck of icebergs freighted with the detritus of circumpolar rocks, and stranded on the shores of seas, estuaries, or lakes; or as having been deposited in deep water by floating icebergs melting as they approached warmer seas. The interstratified deposit, and occasional

appearance of stratification in the mass itself is supposed to be occasioned by a re-arrangement of these materials by subsequent aqueous currents, which are also referred to as having given to the mass the configuration of longitudinal reefs, or truncated mounds.

It is well known, that the present general course of existing icebergs is from the polar regions towards the equator. These icy masses, as we glean from the writings of Scoresby and other navigators, are seen drifting in the open seas—laden with beds of rock and stone, brought from polar regions, the weight of which has been conjectured at from 50,000 to 100,000 tons, which are deposited as they dissolve either on the bed of the ocean, on the coasts, or when they ground. The breadth of one of these icebergs was about 15 miles.

A recent letter to Colonel Sabine from an Officer of the Antarctic expedition, states, that in Lat.  $79^{\circ}$  immense cliffs of ice were met with, forming the sea borders of an enormous glacier, above which, at a great many miles distance, the top of the mountains were visible. The ice-cliff was constantly breaking and tumbling down, and the disjointed masses congregated and floated away towards the equator to  $60^{\circ}$  S. Lat., where an enormous extent of iceberg was constantly to be found floating, and not fixed to any submarine ridge. Here they were constantly depositing by dissolution immense quantities of stones, earth, and other materials brought from the distant antarctic mountains. Still more recently, Mr. Hopkins the mathematician, supported by Professor Sedgwick, accounts for much of the drift on the flanks of the Cambrian chain without invoking the aid of glaciers or icebergs, by the hypothesis of the transporting forces of diverging waves of an ocean consequent to the elevation, or *paroxysms of elevation*, by which the mountains were raised from its bed. Such waves he terms "*waves of translation*," because they are found not to rise and fall like common waves, but wholly to rise, and maintain themselves above the level of the water. The powers of such waves have been reduced to laws by the experimental researches of Mr. Scott Russell, which prove that a sudden elevation of a solid mass from beneath the water causes a corresponding elevation of the surface of the fluid, which infallibly produces *a wave of translation* of the first order.

Arguing that this wave is propagated with a velocity which varies with the square root of the depth of the ocean, Mr. Russell determines



the velocity of wave transmission, and that the old idea of the power of waves extending only a little way down in the sea is not true as touching *waves of translation*,—the motion and power of which is *nearly as great at the bottom as at the top*.

He further demonstrates, that the motion of this wave does not fluctuate, but is continuous and forward during the entire transit of its length ; hence a complete transposition is the result of its movement : and the wave of translation, he says, may be regarded as a mechanical agent for the transmission of power as complete and perfect as the lever or inclined plane.

Reasoning from such data, Mr. Hopkins states, that currents of 25 and 30 miles an hour may be easily accounted for, if repetitions of elevations from 160 to 200 feet be granted ; and with motive powers producing a repetition of such waves he infers, from mathematical and mechanical arguments, that there would be no difficulty in transporting to great distances masses of rock of larger dimensions than any boulders in the north of England.

Mr. Hopkins has also shown by mathematical analysis, that the overland march of glaciers over large and flat continents is a theory founded on mechanical error, and involves conclusions irreconcilable with the deductions of collateral branches of physical science.

Such is a brief abstract, derived principally from the Geological Society's Proceedings of the theories which divide the geological world at home regarding the boulder formation. General Briggs, perceiving that India was silent, while Europe, part of Asia, and America in both hemispheres, were contributing to the general stock of knowledge on this head, applied to some of the local authorities in the East to lend their aid in eliciting information, and among others to the Marquis of Tweeddale and General Fraser, to whom I have already transmitted some memoranda on the subject, at their request.

On mature consideration, however, I am of opinion that the mode I have adopted, of publishing an abstract of the theories on the subject which agitate geologists, with a notice of the leading feature of the principal alluvial deposits of Southern India as far as hitherto known, followed by a short description of the characteristics of the true boulder formation, by which it may be recognized when found in Southern India, and a list of the chief points to which the observer's attention should be directed in gaining useful information on this head,



in language free, as far as possible, from scientific terms, will serve more effectually towards the carrying out General Briggs's views.

*Existence of erratic Blocks and Boulders in Southern India.*

It was Brongniart, I believe, on the authority of M. de la Luc, who first spread among the *Savans* of Europe the idea that the rounded blocks of granite around and in the vicinity of Hydrabad in the plains of the Deccan were true erratic boulders; but after a close and extended examination of them, and of the rocks for many miles around, I am convinced that these blocks are *in situ* (in place,) or nearly so, since they invariably rest upon, or near a granite of the same petrographical character; and that they owe their prevailing globular and rounded form to a process of spontaneous concentric exfoliation which I have endeavoured to explain in a paper published in the *Journal of the Royal Asiatic Society* for 1840.

The granite and limestone blocks at Puttuncherloo near Hydrabad, around Bangalore, Bellary, and in the Carnatic, wherever examined closely, I have found to be of precisely similar origin.

The formation in all these localities is one of granitic rocks, gneiss, and other contemporaneous crystalline schists, penetrated by dykes of basaltic greenstone, varying in structure from compact basalt to crystalline and porphyritic greenstone. The disposition of the last rock to assume a globular or spheroidal shape in weathering is still more remarkable than in the granite, which is often seen in rhomboidal and cuboidal masses, the angles of which are first blunted, and then rounded off by the exfoliation.

The Hydrabad granite blocks are seen lying singly, in confusedly piled heaps, or resting as tors or logging stones on bare bosses of a similar granite; and sometimes buried or half-buried in a soil formed by their own weathering.

At Lunjabunda, in the Kurnool district, I observed a single globular mass of granite about 18 feet in circumference, resting on a bare boss of the same rock, from which apparently the slightest touch would send it rolling to a considerable distance in the plain, and of which the subjoined diagram may serve to convey some idea. (*See plate, Diagram, No. I.*)

The globular block A, is cemented to the boss beneath it B, by a paste *a*, arising from the decomposition of the granite itself, a felspathic

clay hardened by the oxidized iron of the mica and hornblende. Now the block A, might either roll on to a gneiss, or any other crystalline schist at C, or become buried in the alluvion at D. It might be set in motion not only by a stroke of lightning or an earthquake, but by process of its own weathering or that of the boss beneath it, or the washing away by the rain of the cement. The distance to which it might roll would be in proportion to the height and inclination of the boss on which it rests, the slope of the plane at its base, and its own weight and roundness.

In some cases the very rocks from which these globular masses originated, and on which they rested, have weathered faster than the block itself, and have crumbled into the mounds of angular gravelly detritus so common over the whole granitic area of Southern India, known to native cultivators and well-diggers under the names of *Mhurrum* and *Ghurrus*, in contradistinction to the nodular limestone gravel called *Kunker*.

Amid this granitic gravel evidently formed in situ, in some places near 80 feet deep, are occasionally found the hardest spheroidal nuclei of granitic and basaltic rocks. These blocks have longer resisted the decay which has worn down the rock of which they once formed veins or dykes. Such is also the case in the angular gravel arising from the weathering of gneiss and the other crystalline schists, in which granitic and basaltic greenstone so extensively occur in the shape of dykes or veins.

That this gravel has not travelled far is evident from the angular nature of its component fragments, and that it is not the transported angular gravel of a moraine, or iceberg, is evident from the fact of veins of quartz, extending into it from the less weathered portions of the subjacent granite, or crystalline schists from which it is derived. The vein A A, in the diagram is of quartz, which though crumbling like white sand under the pressure of the fingers, is still seen to preserve its relative place and proper direction in the gravelly detritus above B, from the subjacent gneiss. (*See plate, Diagram, No. II.*)

Ovoidal fragments of granite sometimes occur imbedded in gneiss at considerable distances from any surface granite, which when exposed by the decay of the imbedding rock, might in an apparently exclusive gneiss area be difficult otherwise to account for than as a trans-

ported block ; however, wherever we find gneiss in Southern India, the granite is never far distant.

Dr. Benza is inclined to consider the blocks of granite seen scattered on the table-land of Mysore about Golcondapatnam, from the confused nature of their arrangements and the circumstance of no hills of any magnitude being apparent, as erratic boulders : but those which I examined in this locality proved to be out-croppings of granitic veins or dykes in the gneiss which bases this plain, deserted by the softer and more easily weathered imbedding schist. Granite and greenstone are abundant in the surrounding country ; and even when not apparent, its existence must always be suspected in the hypogene areas of Southern India. It must also be borne in mind, if ever granite blocks are found at great distances from the rock whence they were derived, that the surface of India, like that of other countries, has been subjected to waves of translation caused by elevation to the surface.

Insulated blocks, knobs, clusters of granite, like those in the gneiss and granite plains of Hydrabad, Mysore and the Carnatic, have never been observed on the surface of the extensive diamond limestone and sandstone patches of Cuddapah, Kurnool and the South Mahratta country :—and only one small fragment of the former rock on the granitic and hypogene areas, at the base of the Neilgherries by Dr. Benza, which alone cannot be pronounced with any certainty as a true boulder, or transported pebble, as it may have been dropped from the collection of a traveller.

It will be proper to observe, that the Hindus like the ancient Egyptians, in the construction of their temples and statues, manifest a partiality for granite and basalt ; blocks of which they will convey to great distances, if quarries should not happen to be at hand. I have seen a pagoda entirely built of granite amid the Moslem ruins of Bijapore, which is situated on a plain of the overlying trap 16 or 17 miles from the nearest granite rocks.

The Egyptians, who had the advantage of easy water carriage, transported enormous blocks of granite from the quarries of Syene to Lower Egypt. In the desert, as in the jungles of India, are frequently seen fragments of this rock scattered on the sands—the only remaining vestiges of former structures, and many miles distant from the parent rocks.

The tabular summits of the diamond sandstone and limestone in Southern India are often covered with rounded pebbles, which an examination always proved to be those loosened out of the sandstone pudding stones in weathering.

*Diamond gravel.* Beds of gravel, in which I have observed transported pebbles which could not be accounted for by causes now in action, occur in the valley of the Pennaur underlying a steep bed of *regur*, and in other diamond tracts. The diamond is found often as a transported pebble in this gravel; and pits are sunk through the *regur* to it. It is stratified, and bears more resemblance to the gravelly beach of a lake in the size of its pebbles, &c. than to the incongruous mass of a boulder bed. It rarely exceeds a couple of feet in thickness.

*River terraces, &c.* Along the courses of the great rivers of India, for instance that of the Bhima, are occasionally seen river terraces and beds of gravel beyond the highest present floods and inundations. Some of these may be owing to shifts in the course of the rivers themselves, but others indicate the passage of more extensive currents of water than at present.

Captain Allardyce informs me, that the Moyar valley, a mile or more in breadth at the base of the Neilgherries, bears evident marks of having been once the channel of a river, now only visible in an insignificant stream, which even in the monsoon does not occupy one-hundredth part of its breadth. There are beds of sand and gravel in the cross valley of Baugapilly, through which a rivulet cuts its way, which could never have deposited this gravel on the summit of the Ghauts. Captain Allardyce writes me, that traces of a diluvial current exist on the summit of the Neilgherries, upwards of 6,000 feet above the ocean's level; that the gravel and loam there are arranged in such a manner, as could only take place by deposit from water, the gravel being lowest, in a thin distinct and separate stratum, with the lighter loam covering it to the thickness of several feet.

*Lateritic gravel.* Beds of a red ferruginous gravel, principally derived from the true laterite, for which they have been mistaken, exist on the table-lands, near the flanks of the Ghauts and in the maritime plains at their bases; but none of them assimilate the character of the European boulder formation. Some of them are recent alluvia, but



others are evidently derived from the denudation the laterite has been subjected to during the elevation of the land.

*Sand beds of Baroche underlying the Regur.* Beds of a yellowish brown micaceous sand, I am told by Professor Orlebar, underlie the *regur* near Baroche, extending inland as far as Ahmednugger, in which no fossils have been found.

*The Black clay of Coromandel.* The cities of Madras and Pondicherry, and other places on the Coromandel Coast, stand on an alluvium which overlies beds of bluish black clay, interstratified with layers of sand and reddish clay. The surface black clay imbeds marine shells of existing species.

These beds sometimes extend several miles inland. The bluish black clay appears analogous to the *regur*, which will be described below. This accumulation of clays and sands it is probable extends with little intermission along the coast to the mouth of the Ganges, where they will be interrupted probably by the fluviatile deposits of this mighty river. The delta of the Ganges, as far as we can gather from one boring experiment, consists at Calcutta of a series of dark clays and sands; they rest at the depth of 350 to 485 feet on a gravel composed of rolled pebbles of granitic crystalline rocks, similar to those described by Captain Cautley at the base of the Himalayas. The uppermost strata contained portions of peat, kunker, and fragments of trees, and the lowest beds, beneath a layer of dark carbonaceous clay under which were fragments of coal, fossilized portions of turtles, and the caudal vertebra supposed to be that of a Saurian. In the arenaceous beds above this, more than 200 feet from the surface, were found the lower half of a humerus, which Mr. Prinsep supposed to be like that of a dog, and a fragment of the carapace of a turtle. From the granite and gneiss gravel it has been inferred by Dr. McClelland, that bold mountains of these rocks existed in close proximity to the present site of Calcutta. The superimposed carbonaceous beds indicate a marshy surface clothed with vegetation, prior to which the currents which brought down the gravel, he thinks were arrested by the contemporaneous subsidence of the mountains and the lowering of the bed of the Ganges.

*The Regur deposit.* In a paper read before the Royal Society, several years ago, I have already endeavoured to show that the remarkable loam called Regur, is not a fluviatile deposit, as supposed by



Voysey, nor a modern alluvium washed from the trap rocks as thought by Christie, but a deposit from water in a state of repose, or nearly so.

The principal objections to these theories of Voysey and Christie are,

1st. The great extent and geognostic position of the regur, covering both the tabular summits of hills, the bottoms of vallies, vast almost treeless plains, with a sea-like horizontality of surface, often far removed from the least influence of existing rivers and low floods. Its occurring in broad detached patches often far above the long, narrow lines of drainage.

2nd. Its underlying occasionally all present alluvial soils, those of the trap included, and filling up chinks and fissures in the subjacent rocks.

3rd. Its overlying granitic, hypogene, sandstone, limestone, and lateritic rocks indiscriminately, far distant from trap rocks which it also overlies.

4th. All trap rocks in weathering, redden by peroxidation of the protoxide of iron they contain ; and usually form first a brown, then a reddish-brown, or coffee-coloured soil.

5th. The regur, at a distance from trap rocks, imbeds no fragments of them, even of their hardest and most lasting vein stuff, such as quartz, jasper, heliotrope, agate, and calcedony. It often imbeds fragments of whatever rocks it may happen to overlie, or which are washed into it.

6th. The remarkable homogeneous character and colour of the regur over large areas, when free from recent foreign admixture, to which it is subject, as well as to re-arrangement from present rains and inundations.

7th. The different colour, generally shades of brown and red, of the present fluviatile deposits of Southern India, and their varying character over small spaces even.

In common with some clays of the boulder deposit, the stratification of the *regur* is rarely apparent, and always obscure. But this phenomenon I have observed in the mud of tanks over which the water has been deepest and stillest, and where the particles deposited were of a very fine and homogeneous character. In proportion as the nature of the mud deviated from these conditions, and became intermixed with silt and sand, the layers of deposition became more and more distinguishable.

This I also remarked to be the case with the mud of the Nile, particularly in the upper parts of its course through Egypt : but on the Delta where the slope of the bed is still less, and the motion of the stream languid, the stratification is more obscure.

Both in the mud of the Nile, and in that of the tanks of India where annual layers of deposition may be strongly marked, the layers of monthly, weekly or daily deposition are indistinct or not to be traced ; hence the interior of the annual layer individually has an unstratified appearance. The same is observable in the structure of some individual beds of enormous thickness, as in the thick-bedded sandstones, in which, if the particles are of a homogeneous nature, stratification is hardly visible even on the face of cliffs 200 or 300 feet high.

It is possible that the *regur*, which is often thirty feet thick, from its generally unstratified aspect and homogeneous character—containing no interstratified layers of sand or pebbles, was the result of one period of deposition. In areas where stratification is said to be more distinct, for instance in Baroche, the deposit has probably undergone re-arrangement by subsequent currents. It is just such a deposit as might be expected to result from deep waters charged with the debris both mineral and vegetable of a submerged continent, the coarser and heavier fragments of which, as well as the silts and sand, had been deposited or left behind by the slowly retarding current. At length, as the waters gradually gained their level, the turbid fluid, now charged with nothing but the very finest and lightest particles, would move so slowly as to admit of their gradually sinking and being deposited on its bed. Above the first cataract and in Upper Egypt, where the current is more rapid, the deposit is usually of a coarse, and more silty nature than in Lower Egypt and on the Delta, and not of so carbonaceous a nature. Many of the finest particles are never deposited at all by the Nile in Egypt, but are carried out with its waters, and discolour the Mediterranean upwards of 70 miles from its embouchure. The sea water from its great specific gravity adds to the obstacles against deposition. The deposit of the Nile in some parts, as well as those of some tanks in India, not only resembles the *regur* in external appearance and colour, but also in chemical character. All three contain a considerable portion of vegetable matter.

In colour, extent, and position, the *regur* resembles the Tchéroni Zem covering the plains of Russia; and in apparent want of stratification that fine yellowish-grey loam called Loess, which covers great part of the basin of the Rhine in beds sometimes 300 feet thick. The *regur*, however, contains no fossils except such present fresh-water and terrestrial shells as are washed into it. If we suppose the *regur* to be the deposit of annual inundations from ancient glaciers (which Mr. Lyell takes to be the origin of the Loess) charged with the impalpable mud of their moraines, we must examine the Ghauts and Vindhya, or even the Himalayas below the influence of present glaciers, for the usual signs of glacial action. The soil now washed down from these mountains, I need hardly observe is reddish and sandy, very different from the deep black or bluish black *regur*: but this difficulty may be perhaps got over by supposing the vast forests which clothed them during the warm ante-glacial period to have perished with the mammoths they shaded, and to have been ground down by glacial action with the felspathic, silicious, calcareous, and ferruginous particles of the subjacent rocks.

If we suppose it to be a deposit from former great inland lakes, in most cases we shall have to raise up rock barriers, not now in existence, to separate them from the sea and the adjacent lower lands, to sink them again; and, in fact, to change the entire physical configuration of the country. If it be considered a deposit thrown down on a sea bottom from melted icebergs, we ought to see in it large angular fragments of distant rocks, which no observations as yet show to be the case.

The non-fossiliferous character of the *regur* is common to the mud of the Nile, and may be regarded as indicative of the great trituration the debris composing it has undergone; and probably that chemical and other causes have combined to prevent fossilization in this soft mud.

*Rock-basins.* Rock-basins, the giant's caldrons of the Swedes, are seen occasionally on the summits of table-lands in Southern India, as for instance near the Kurnool frontier, with Baugapilly, and in other localities both in granitic and hypogenic rocks, and in the diamond sandstone and limestone in situations above the present action of running water; but when we see them in the fact of being excavated by water alone in the rocky beds of the principal rivers of India during these periodical rises and falls—conditions favourable to their production—

there appears no necessity for introducing the action of glaciers to account for their presence, which I have explained in detail elsewhere.\*

*Furrows and parallel Striæ.* On and near the tops of the diamond limestone ranges of Pycut Puspulah, and Yairypilly—not far from the granite junction near Gooty, I have seen the surface of the rock traversed by furrows, having a common direction of N. by E., resembling those attributed to the action of glaciers; but in Europe even, where these marks are so numerous, the opinions regarding their origin have been latterly so conflicting, that their unsupported testimony may be regarded as much in favour of the diluvialist or of the advocate of the waves of translation, as of the glacialist and icebergian.

I have since had opportunities of carefully examining the grooves which cover the surfaces of the diamond limestone rocks near the caves of Billa Soorgum, Kurnool frontier, and on the summits of the hills between Dhone and Yeldroog in the Bellary district.

The limestone slabs in these localities dip slightly towards the east, and are in some places completely scored with furrows, which observe a parallelism over confined spaces. These furrows vary from the size of a goose quill in diameter to two inches, and are often separated by scabrous sharp edged ridges. They are often traversed by others at oblique and right angles so close together that the dividing ridges are cut up into a number of pointed cones, or pyramids.

It is quite evident from the sharpness of the edges and points of the ridges, that the grooves were not formed by the passage of gravel moved under the enormous weight of a glacier. The interior of the furrows has frequently to the eye a smooth apparently water-worn surface; but if the point of the finger be moved gently along the bottom, it will often be found to undulate. These undulations have been caused evidently by the wearing down of the lips which formerly separated the now continuous trough into a chain of oval or spheroidal cavities exactly resembling in miniature the chains of rock basins worn in the granite and gneiss of the Toombuddra.

Like them the majority of these furrows are attributable to watery erosion. They occur usually on the lines of almost imperceptible fissures in the rock-like vallies of erosion thus. (*See Plate, No. III.*)

\* Vide Proceedings of Geological Society, 1841-2.



They not only traverse the upper horizontal surface of the strata, but sometimes continue over the edges down their vertical extremity or sides, which is attributable to the action of water slowly trickling over the edge, and not propelled beyond the edge to a distance from the vertical side, as is the case in a cascade. .

The water, in many instances, seems to have acted corrosively as well as erosively on the substance of the limestone; for in examining some rain water, which had lodged in one of the eroded cavities, I found it held a considerable quantity of lime in solution. Carbonic acid might have been supplied from atmospheric exposure or from the surrounding dense vegetation, which the rains refresh. The solvent power of water too in tropical climates is considerably enhanced, not only by the increased temperature of the water itself, but by expansive action of the sun's rays on the atoms composing the rock-bare surfaces, some of which I have found often heated to 130°. The solid layers of schist are free from such furrows, but have a scabrous water-worn appearance, as if the limestone had been washed away.

Any pre-existing cavity in the surface of the rock forming a lodgement for the water, assists in the erosion of hollows. Strings of iron pyrites frequently drop out in weathering, leaving a chain of oval cavities, which the water soon works down into a continuous furrow. Others commence in the perforations of lithodomous molluscs, or those of existing snails which apparently by the chemical action of their juices take up the lime necessary for their house and food, and are found in numbers adhering to the surfaces and sides of the limestone.

It is evident, however, that some of the furrows were scooped out prior to the last displacements of the rock strata, as they partake of the faults and dislocations; and it is probable they were formed during the elevation of the land by sea water, as it is well known that sea water by the decomposition of its muriates and sulphates produces furrows and wrinkles on the surface of limestone, particularly near the water's edges, and subsequent rains have no doubt acted in extending and modifying them. The entire absence or great comparative rarity of such furrows on the surface of the associated sandstone, may be regarded as a further indication of the chemical action of the water in producing the furrows on the limestone.



In some places on the sides of the hills, the ends of the limestone beds protrude in steps about a foot high, down which the rain water has evidently flowed in a series of miniature cascades, which have hollowed out on the slabs below little cavities, and depressions not unlike the *lapiaz* of the Alps, marked by *a a* in the subjoined sectional diagram. (*Plate, Diagram, No. IV.*)

*Variolated surfaces.* The surface of some slabs exposed to the air I observed to be perfectly variolated with *circular*, shallow cavities, caused by the dropping out of *cubic* crystals of iron pyrites. These crystals may be seen in every stage of decomposition,—first tarnishing, and losing their bright metallic lustre; next passing into a bronze-coloured hue: they then become liver-coloured, and lastly pass into a loose rust-coloured dust. At this stage, the limestone becomes stained by the rust nearly in semi-circles, marked *a a a a*, on each side of the crystal marked *b*, in the Diagram *b*, representing the decomposing crystal of pyrites. (*Plate, Diagram, No. V.*)

In the next stage, the angles between *a a a a*, become discoloured, and the whole stain takes a circular form; then the centre occupied by the crystal drops out, and finally the whole circular space, occupied by the rust-coloured stain.

*Mark of ancient rains.* Surfaces of rock variolated with such cavities must not be set down as having been indented by an “antediluvian shower,” though marks exactly similar to those supposed to be the effects of ancient rains exist on slabs below the surface covered by other layers, the lower planes of which exhibit the casts of these impressions.

*Ripple marks.* Ripple marks are seen in similar situations to the rain-drop impressions, but are much more frequent in the associated sandstone.

*Striæ and Furrows on granite and gneiss.* Striæ and furrows on granite, gneiss, &c. in situations beyond the reach of present aqueous causes are rare, and, from their conforming to the hard and softer parts of the rock, cannot be set down as marks of glacial action. These rocks, as before observed, are much subject to exfoliation by atmospheric exposure; consequently ancient marks, if they did exist, are liable to early obliteration on the air-exposed surfaces of such rocks.

*Concluding observations.* In reviewing all these deposits I can trace nothing analogous to the true boulder deposit, or to the action of glaciers, in the marks and furrows of the rocks just described. There is nothing which cannot be explained by existing causes, or by the supposition of the action of water during the oscillations which, there can be no doubt, the face of India has undergone.

The power of the wave of translation is written in large characters of denudation over its entire surface; or they stand out in bold relief in the bare dykes and naked clustered masses of basaltic greenstone and granite, and also in the harder beds and veins, which we see every where abruptly projecting, like the trap of the Wrekin in Shropshire, from the softer abraded strata around. It is visible in some of the larger gravels, and in the isolated horizontal beds of sandstone and laterite capping hills separated by denuded vallies and plains.

To the gentler effects of the waters retiring as the land gradually emerged from beneath, aided by minor oscillations, may be attributed the former wider channels of the rivers—the river terraces, the inland marine clays and sands on the coast of Coromandel, indicating former estuaries, and coast lines and inlets, now dry land; beds of gravel and loam in the interior; furrows and rock basins beyond the reach of existing aqueous causes, and ancient marl-bottomed lakes now desiccated, the existence of which is now only indicated by fossil lacustrine deposits, for instance, those of Nirmul.

The agency of floating ice in conveying the granite blocks we see imbedded in the mud and gravel of the east coast of England, from the mountains of Scandinavia across the intervening seas, is now pretty generally admitted.

One remarkable feature of the boulder formation still remains to be noticed, viz., its extreme rarity in warm latitudes, and its great prevalence in the cold and temperate regions of both hemispheres. In the northern hemisphere we behold it stretching from the icy regions of Scandinavia to about  $55^{\circ}$ , and overspreading part of North America; and in the Southern world it has been traced, with precisely the same features as in Europe, in Chili and Patagonia, between  $41^{\circ}$  South and Cape Horn.

This fact is considered by Mr. Lyell to be in favour of the iceberg theory, since the masses of drifting ice in approaching warmer latitudes would melt from the warmth of the sea and the action of the sun's rays on their sides and surface, and discharge their rocky freight long before reaching the equator.

The absence of the boulder formation in Southern India would add weight to this supposition; but until it has been more thoroughly searched for, we must not jump to this conclusion. Its comparative rarity, however, from the evidence even at present before us, cannot be doubted. I have sought for this formation, and also the old Silurian beds in countries yet nearer the equator, in the Malay peninsula, but in vain:—also on the southern and eastern coasts of the Mediterranean, the Red Sea, Egypt, the southern parts of Asia Minor, and the Peninsula of Sinai; but with similar success.

To support both the glacial and iceberg theories a period of intense cold in regions where a temperate climate now prevails, is supposed, as before stated, to have existed at a period between the extinction of mammoths and the creation of man. This cold, it is natural to imagine, would influence more or less the climate of countries nearer the equator, and among the rest that of Southern India; but as yet proofs of this decrease of temperature in the latter, either by the existence of the fossil fauna of more temperate or colder zones, the marks of ancient glaciers, or by other physical facts, are a desideratum.

For recent marks of glacial action, the Himmalayas afford perhaps the best examples nearest the equator, and should be examined with care for ancient moraines, and other indications of a former greater extension of the ice and snow which now cover portions of the peaks and sides. If they be found, the next step will be to ascertain whether such extension of ice is ascribable to a former general decreased temperature of the surface as it now exists, or from a former state of greater elevation of these mountains. It has lately been argued, from the circumstance of fossil animals of warm climates having been found in tertiary Himmalayan deposits now above the line of snow, that the Himmalayas must have been elevated about 10,000 feet since the extinction of these races. It is, however, possible that dur-

ing the warm climates of the tertiary period these animals may have existed at the heights at which they are now found, or even at greater elevations. The geologist will do well, while marking the scale of former glacial extent in these instructive regions, to note also the nearest approach, habitual or casual, to the snow line of the subtropical animals at its base. The monkey and tiger have been observed close to it, and the elephant at no very great distance— $31^{\circ}$  N. lat. 4000 feet above the sea. Tropical perennials are blended with a flora almost alpine, and the palm and the pine are seen in juxtaposition.

The sub-Himalayan gravel beds entombing the remains of the sivatherium, mastodon, elephant, rhinoceros, hippopotamus, &c., and the mastodon beds in the valley of the Nerbudda, are all stratified, and belong apparently to the tertiary period immediately antecedent to the supposed cold epoch of the boulder formation. (Vide concluding page at the end of *Desiderata*.)

India, stretching down from its vast icy barrier on the north to the verge of the equator, presents a wide field for physical observation; a thousand-times-told fact, but one which should never be lost sight of. Its surface has been but partially examined, and many large tracts wholly unexplored by the geologist. A few years only have rolled on since the great mammifers in its deposits, just alluded to, were brought to light by the vigorous researches of Captains Cautley, Durand, Baker, and Doctors Falconer and Spilsbury; and still more recently it has been proved by the splendid fossil discoveries of Messrs. Kaye and Cunliffe in the limestone beds of Pondicherry and Verdachellum, that the cretaceous sea extended over the surface of at least part of Southern India. Major Franklin has referred the diamond sandstone and limestone to the Oolite and Lias, though at present they cannot be satisfactorily classed with these rocks until further fossil evidence be obtained.

The scantiness of these beds—the utter absence of the new red sandstone, magnesian limestone, and other aqueous deposits so abundant in northern zones, has been long subject of enquiry. The Silurian strata are also entirely wanting, and appear to thin out like the boulder formation as the equator is approached; although the temperature of the Palæozoic seas, if we may judge from the number of their corals, must have been like that of the carboniferous period, warm. I am



not aware, that the Silurian strata extend in Europe further south than the vicinity of Constantinople.

Are we to infer that these enormously thick aqueous deposits, abounding in the remains of marine creatures of strange and unknown aspect, since the appearance of which whole generations of others equally strange have replaced them and been obliterated in turn from the face of creation, *have* existed on the granites and trap of India, but have since been swept off by waves of denudation: or must we suppose, that these old fossiliferous rocks never had existence in Southern India and tropical countries, from the peculiar chemical conditions, or temperature of the seas which then covered them? Or, that the surface of these tropical regions was above the water at the time these deposits were going on in the then warm coral-producing seas around the arctic zone?

It may be also advanced, that the hypogene or crystalline rocks, which prevail so much in Southern India, are nothing less than the metamorphic fossiliferous strata of these periods. It must, however, be objected against this theory, that no fossil has ever been found in them, even at great distance from granite or apparent Plutonic action.

It has already been inferred, from the rarity or absence of the boulder formation in Southern India and other tropical and subtropical countries, that these regions enjoyed a warm climate during the frozen period which M. Agassiz assigns to now temperate climes during the boulder epoch. As there is no evidence of the climate of the former regions during the Silurian period, or of the then chemical condition of thier seas, it will be advisable, until better information be elicited, to refer the absence and the rarity of the older fossiliferous groups of Europe to the hypothesis of partial or entire elevation during such periods. Of denudation there is ample proof in subsequent periods, as before stated. We search in vain (the chalky spots near Pondicherry, Verdachellum, and a few other marine patches—isolated, yet significant monuments—excepted,) for remnants of these former fossiliferous coverings. I have not been able to trace a pebble from their detritus in any of the conglomerates, breccias, or gravel beds which now exist on its surface. If such beds ever did occupy the surface, their wreck for the most part must now lie in the bed of the ocean.



If Southern India was above the ocean during the deposition of the Silurian rocks, and other fossiliferous strata, of which no remains now exist on its surface, it must have subsequently undergone oscillations by which portions, or the entire mass, including the tract occupied by its grand physical feature, the Western Ghauts, were submerged, and again elevated to their present position with the laterite which, there is every reason to believe, belongs to the tertiary epoch. That at least a portion of Southern India must have been a sea-bed during the cretaceous period, has already been shown.

Some of the points latterly touched upon in this paper involve, it will be perceived, the highest and most interesting problems in physical geology, which cannot be solved until much more evidence be accumulated regarding the geology and former physical phases of tropical and sub-tropical zones. It has been ascertained beyond doubt, that the seas of ancient periods formerly covered a far greater extent of what is now land in the northern hemisphere, and the contemporaneous and much greater relative prevalence of land within or near the tropics is supposed, in order to account for the higher temperature which, it is evident, then prevailed in northern regions; but the present decrease of which is accounted for by Sir John Herschel on astronomical grounds, viz., that the *mean* amount of solar radiation is dependent on the eccentricity of the earth's orbit, that this eccentricity is, as has been for ages, actually on the decrease; and with it the annual average of solar heat radiated to the earth's surface.

*Desiderata on the Boulder formation.* In the hope of eliciting information touching the occurrence of the boulder formation in India, (and how much might be obtained even from persons entirely ignorant of geology now crossing India in every direction,) I have drawn up a few plain directions by which the true boulder formation may be readily distinguished from the ordinary gravels and alluvia of the country; and have added a list of the principal points on which information is required.

Sir John Herschel has well observed, "What benefits has not geology reaped from the activity of industrious individuals who, setting aside all theoretical views, have been content to exercise the use-

ful and entertaining occupation of collecting specimens from the countries they visit." This observation applies particularly to India—the geology of which is so little known—where, it is true, there are no professed geologists attached to our surveys; but where every individual has the means and ability of adding his mite to the general stock of knowledge, without any serious encroachment on his duties or his pleasures. "Even those who run may read" in the great open book of Nature; and if they read, there is no reason why they should not note, for the benefit of those who have not the opportunity of studying, the same pages.\*

*Boulders and erratic Blocks.* The term "boulder" has been often misapplied to any loose rounded block of rock lying on a plain, or elsewhere on rocks, or the soil of rocks, of which it originally formed part. This is not a "boulder" in the geological acceptance of the term, the block being *in situ*; or not distant from the rocks of which it once formed part. A true boulder is a mass of rock, the corners of which have been rounded, from the size of a man's head to that of a field-officer's tent or a small bungalow, found detached and *at a distance* from the parent rock of which it once formed part, and resting on rocks generally *of a different nature*, or imbedded in gravel, clay, or loam.

Erratic blocks are fragments of rock, with sharp or little blunted corners, found in similar situations as boulders, or what is termed not "*in situ*," or transported from their native beds. Among the most remarkable erratic blocks in the world are the angular blocks of granite and gneiss, some as large as a Swiss cottage, which rest on the limestone rocks of the Jura. Now the nearest granite and gneiss rocks are those of the Alps, from which it is certain those blocks have been derived, although the great and deep valley of Switzerland, upwards of 50 miles broad, separates the two ranges.

\* While Captain Newbold was writing this forcible passage at Kurnool, Lieutenant Sherwill was forwarding to the Society from Behar the splendid map and collection of specimens which we noted in our Proceedings of January 1845, and which the Society has most properly brought to the special notice of Government. It is impossible to give a better illustration of the truth of these remarks.—Eds.

A block of mica schist, weighing upwards of eight tons, lies on the top of the Pentland hills, 1000 feet above the sea, 50 miles from the nearest mountains of mica schist.

When loose, round, or angular masses of rock are seen on the surface, or imbedded in loam, clay or gravel, the nature of the rock and that of the subjacent and adjacent rocks should be compared. If they are similar, it will be difficult to prove the masses true boulders. If different, the bearing and distance of the nearest similar rocks should be ascertained, and the nature of the intervening ground described whether intersected by valley, hill or stream, &c. In all cases, specimens about two inches square or more of the blocks, the adjacent and subjacent rocks, and of those from which they are supposed to have been derived, should be broken off, and wrapped up in strong paper and carefully marked.

If it be certain that they are *boulders*, or erratic blocks, and not "*in situ*," their size and shape and number should be described, drawings made, the arrangement and longitudinal direction of the blocks, their bearings by compass, the height above the sea if possible, a description of the physical features of the locality and surrounding country. When circles of blocks are found round the tops of hills or other projecting points of the surface, care should be taken not to confound the old cairn-like mounds, circular burial places, old sheepfolds, remains of forts, or other old enclosures scattered over India, for the circles called "perched blocks."

The old inhabitants and watchmen (Taliaries) of the nearest village, should be carefully questioned on such points.

When erratic blocks can be traced to the parent rocks, it should be carefully noted whether they gradually increase in size as the rocks whence they were transported are approached.

*Gravels, Clays, and Sands of the Boulder formation.* The boulder formations of England, (called "Till" in Scotland,) of the north of Europe and America, and also that in the opposite hemisphere, are—1st, characterized, principally, by their generally unstratified character; 2nd, by imbedding both large and small, angular and rounded fragments of rocks of all ages in juxtaposition, confusedly jumbled together without reference to the laws of gravitation

or aqueous deposition, which are often reversed in the boulder gravels and the heaviest fragments found uppermost ; 3rdly, the great rarity of fossils. A few marine shells of an arctic character and the remains of a mammoth have been found in the *till* of Ayrshire ; arctic marine shells in that of North America ; and I have observed marine shells of recent species in that of Cheshire.

The boulder formation, in short, consists of usually unstratified accumulations of clay, loam, silt, sand or gravel, often 100 feet thick, imbedding sometimes great fragments of rock several yards in diameter, torn in many instances from rocks, hundreds of miles distant, separated by vallies, rivers, and even seas, as is the case in the drift on the east coast of England, which imbeds granite blocks from the mountains of Scandinavia. These deposits are sometimes capped by stratified layers of sand and gravel, and occasionally contain marks of stratification themselves.

The observer having, by these marks, ascertained that he has a boulder deposit before him, should note its general shape, direction and dimensions. If it occurs in detached truncated mounds, or tumuli like the terminal moraine of a glacier ? or like lateral moraines, in longitudinal ridges with a double talus ? the continuity and parallelism at the same height which is supposed to distinguish the lateral moraine of a glacier, from the debris disposed along the bottoms of the vallies by currents ? The thickness and extent of the gravel, sand, clay or loam composing the deposit, should also be noted ; the nature of the beds it rests upon, and also of those above it ; of all which specimens should be sent, as well as of the curious pebbles, sands, clays, &c. of the boulder deposit. It also should be noted whether the stratified portions of the boulder clays or gravels be bent up or contorted, as if by lateral pressure ; and whether the subjacent beds have been conformably or similarly disturbed.

The relative proportions of the pebbles of various sorts of rocks composing the gravel, their relative size, degree of attrition or roundness, should be ascertained ; and the different sites whence originally washed, searched for in the vicinity.

The gravel, clays, mud and loam should be examined for fossils ; and the condition of the latter, whether broken, water-worn or entire, and in good preservation, noted.



*Furrows, striated and polished surfaces.* The sides and surfaces of exposed planes, bosses, boulders, erratic blocks and masses of rock in situ, should be examined for polishings, striæ, or furrows, more particularly the surfaces of rocks which are protected by a covering of soil or turf, which it will be necessary to remove for this purpose. It must be noted whether the striæ and furrows are parallel or otherwise; whether oblique or horizontal, and their general direction. If in a valley, whether they run in the same direction as the valley, and diverge from it at the outlet.

Whether they run in *right lines, with even, uniform polished surfaces, or are shallower or deeper, varying according to the different degrees of hardness or softness of the different portions, and veins of the rock, and whether their course is at all sinuous.* "Slickensides" or the polished and striated surfaces of walls of fissured rocks and vaults caused by their friction in dislocation, must not be confounded with the marks of general or aqueous action.

The observer should endeavour on the spot to ascertain the possibility, or impossibility, by the supposition of present floods, rains, landslips, or other causes now in existence, of explaining these depositions, furrows, &c.; and also of the circular, oval, and spoon-shaped cavities, with smooth sides in rocks, termed rock-basins, which are often united by shallow gutters. It should be ascertained whether they are or are not within the reach of the highest inundations, or temporary petty cascades caused by monsoon rains, the periodical risings and fallings of rivers; whether empty or containing sand, or pebble; the nature of the pebbles, the dimensions and shape of the cavities, and nature of the surrounding ground.

Engineers, surveyors, and other servants of Government stationed in districts, will have time to note on all these desiderata as affecting their particular district; but it will be sufficient for men who travel rapidly from station to station, or on the line of march, to bear in mind that the great points to ascertain are—whether the blocks and gravel they see are composed of the adjacent and subjacent rocks or not, their distance from their native beds; to send specimens of all: and to see that the blocks and marks on the rocks are above the influence of present water-courses, inundations, and rains.



Since writing the above, I have perused Captain Herbert's valuable report on the Himmalayas, so properly rescued from oblivion, and so handsomely presented to the subscribers to the Journal of the Asiatic Society by Mr. Torrens, and find that the author notices deposits of unstratified gravel and sand, including boulders some of three feet in diameter, occurring in these vallies; and also along their base in a vast accumulation 192 miles long, nearly 10 broad, and sometimes upwards of 150 feet thick, and which, from being inexplicable by the supposition of existing floods and streams, he calls *diluvium*.

From his description, it seems to me probable, that some of these deposits and their attendant phenomena have been caused by the action of glaciers and debacles, the result of their melting.

The whole of them, and the *Tals* or lakes upon them, are well worth separate and extended investigation; and diligent search should be made on the rocks of the sides, surfaces, and outlets of the vallies, for the other supposed marks of glacial action just enumerated, and of which Captain Herbert has given us no information.

Among other promising localities may be enumerated the great transverse *Doons*, or vomitories of drainage, through which flow the Ganges, Sutlej and Jumna, the Ramgunga and the Gaggur, from their bases of glaciers; the mouths and sides of the glens opening into them; the vallies of the Burrel and Dhaolee, and of the Pubbur near Massooleea.

The immense bed of gravel and masses of rock called the *Bhabur*, which stretches along the base of the mountains, succeeded at its southern base by the remarkable terrace called the *Terrai*, both cut transversely through by present river channels; and the level-surfaced gravel and sand deposits locally termed *Khadirs*, through which many of the streams run, may be particularly pointed out as subjects for detailed information. Some of the mountain-streams are engulfed, according to Captain Herbert, in the gravels of the *Bhabur*; but probably reappear in the line of springs visible at its junction with the step of the *Terrai* which, from its striking moistness compared with the dry absorbent surface of the *Bhabur*, is probably a bed of some impervious substance, such as clay.\*

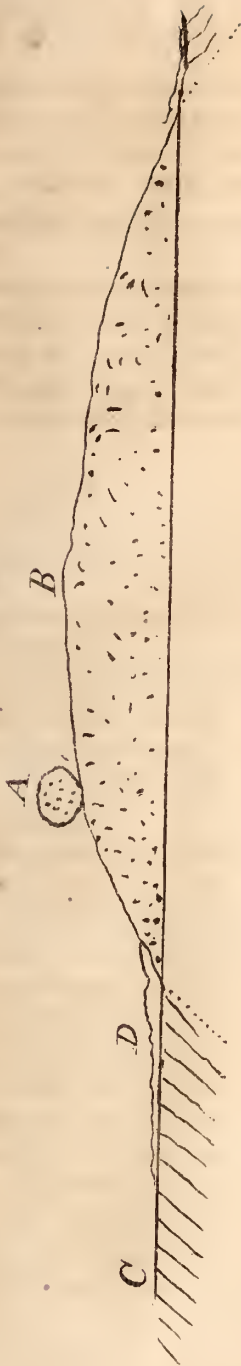
\* See Mr. Batten's valuable observations on the Terrai of Rohilcund and Kemaon, Journal, Vol. XI, p. 887.

Outside of this so-called tract of diluvium, Captain Herbert mentions a red earthy marl, with patches of sand and a blue clay, the relations of which with the unstratified gravels should be minutely described, and every search made in them for fossils. The black and blue clays may possibly bear some affinity to the *regur* in mineral composition.

I have not been able to consult Professor Royle's admirable work on the Himmalaya, or Dr. M'Clelland's valuable geological observations, in the remote part of India where I now write; but cannot conclude this list of *Desiderata* without strongly recommending their perusal to the observer travelling through or located in the interesting districts of which they treat.

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N<sup>o</sup> I



N<sup>o</sup> III



N<sup>o</sup> II



N<sup>o</sup> IV



N<sup>o</sup> V



Diagrams to Cap<sup>t</sup>. Newbold's Paper



*Proceedings of the Asiatic Society of Bengal, MARCH, 1845.*

The monthly meeting was held at the Society's Room, on Tuesday, the 18th March, at  $\frac{1}{2}$  past 8 P. M.

Charles Huffnagle, Esq. in the chair.

The following list of books presented and purchased was read :—

*Books received for the Meeting of the Asiatic Society, Tuesday, March 18th, 1845.*

BOOKS PRESENTED.

1. Meteorological Register kept at the Surveyor General's Office, Calcutta, for the months of December, 1844, and January, 1845.

2. Jahrbücher Der Literatur, of 1843, vols. 4.—By the Baron Von Hammer Purgstall.

3. Geschichte Der Ilchane, by the Baron Von Hammer Purgstall, vol. 2.—By the Author.

4. The Sugar Planter's Companion, by L. Wray, Esq. Part II.—By the Author.

5. Proceedings of the Academy of Natural Sciences of Philadelphia, vols. 2, Nos. 2 and 3.—By the Academy.

6. The Oriental Christian Spectator, for the months of January and February, 1845, Nos. 1 and 2.—By the Editor.

7. The Calcutta Christian Observer, for the months of February and March, 1845.—By the Editors.

8. Journal of the Agricultural and Horticultural Society of India, Part IV.—By the Society.

9. The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, No. 165, September, 1844.—By the Editor.

10. Proceedings of the Geological Society of London, vol. 4, No. 98.—By the Society,

11. The Journal of the Royal Geographical Society of London, vol. 14, Part 1. 1844.—By the Society,

12. Proceedings of the Royal Society, No. 59; 1843-44.—By the Society.

13. Philosophical Transactions of the Royal Society of London for the year 1844, Part II.—By the Society.

14. Recherches Sur les Poissons Fossiles, par Lt. Agassiz, Quatorzième, Quinzième et Sixième livraisons réunies, 1842 and 1843.—By the Editor.

15. Ditto Ditto, Planches Quatorzième, Quinzième, et Seizièmes livraisons réunies. 1841 and 1843.—By the Author.

16. Specimens of the illustrations of the Rock-cut Temples of India.—By J. Ferguson, through W. Ferguson, Esq.

17. Five Maps of different parts of Asia, Berlin, Beimer.—By the Rev J. Hæberlin.



## BOOKS EXCHANGED.

18. Calcutta Journal of Natural History, January, 1845, No. 2.—By John M'Clelland.
19. The Annals and Magazine of Natural History, including Zoology, Botany and Geology, Nos. 92, 93, 94 and 95 of November, 1844, to January, 1845, vols. 14 and 15.
20. Journal Asiatique. Quatrième Serie. Nos. 14 et 15, Mai et Juin 1844. Tome 111.
21. Journal des Savants, Juillet, 1844.
22. The Athenæum for November 9 and 16,—December 7, 14, 21 and 28, 1844, and January, 1845,—4-11, and 18.

## BOOKS PURCHASED.

23. History of the Indian Archipelago.—By J. Crawfurd.
24. Strange's Elements of Hindu Law, vol. 2.
25. The Classical Museum, No. VI., January, 1845.

Mr. C. Joseph presented a copy of his map of the river Hooghly, from Garden Reach to Bandel.

Read the following letter from Messrs. Allen and Co., the Society's London Agents.

HENRY TORRENS, Esq. *Secretary to the Asiatic Society of Bengal.*

SIR,—We beg to state you, for the information of the Society, that we have every reason to expect the completion of the bust of Mr. Hodgson in the course of six weeks or two months from the present date.

We have, as requested in your letter of the 30th May last, applied to the Proprietors of the Athenæum and Spectator respecting the non-receipt of their publications by the Society since December, 1840. We have not been favoured with a reply from either party, and conclude it is not their desire to make an exchange of publications with your Society. It is not quite usual for the Proprietors of Newspapers to furnish gratuitously their publications. They expect to receive and very seldom make any return.

The Journal of the Royal Institution has not been published for years. In our next parcel to the Society, we shall include the Asiatic Journal from January, 1841, to the present time, and it shall be continued as published in future. Your favor of the 5th October last, acknowledging the receipt of our account sales, and giving us instructions as to the disposal of the balance, shall have our best attention.

We have the honour to be, Sir, your faithful Servants,

London, January 12th, 1845.

W. H. ALLEN AND Co.

Read correspondence, with notes by the Secretary and Committee of Papers, from Mr. J. Hendrie, soliciting employment as draftsman to the Society, and claiming payment of a bill to the amount of Co.'s Rs. 250, which had been submitted by him for work done on trial.

Resolved that the recommendation of the Committee of Papers, that Mr. Hendrie be paid the sum of Co.'s Rs. 150 for the works submitted, be adopted, and that the Committee of Papers be requested to report further as to the expediency of the employment of Mr. Hendrie.

Read the following note by the Secretary :—

At the December meeting Dr. Hæberlin announced through the Secretary his intention of publishing a Sanscrit Anthology consisting of fifty brief but choice specimens of the best School, that of Kali Dasa, of Sanscrit poetry, didactic, elegiac and others. This offers to the Sanscrit Scholar a description of work as yet a desideratum in the learned world, a book namely, which may enable him to study in brief, and at small cost, the best and choicest classical style of eminent writers in that ancient and admirable language. Dr. Hæberlin proposes to publish the work himself, but in communication with him the Secretary suggested to the Society their taking a certain number of copies of it. It will prove a most valuable book to the Society, for the purpose of distribution to learned bodies, and individual scholars in correspondence with it. The copies will be delivered at trade price. He stated that he was not prepared to note at present the number of copies to be taken, but after making a list of quarters in which they might be distributed, and a reasonable stock of reserve copies, the Secretary said he would have the honor of laying that list definitely numeralised, before the Society if the general proposition be favourably received.

The Secretary stated that it had been deemed advisable that the Society should subscribe for 100 copies of this interesting work, which was agreed to.

The Secretary presented on the part of S. G. T. Heatly, Esq. an abstract of the proceedings of the former Statistical Committee of the Society, (December, 1836, to March, 1839,) and it was resolved—

That the records which are not at present forthcoming be searched for, that the abstract be circulated to the Committee of Papers, that the Committee of Papers resume the Statistical Committee's deferred privileges, and that it be recommended to them to re-agitate the right of free postage, &c. &c.

The Secretary stated that he had received from Captain Cunningham and Mr. Tregear a collection of coins which they offered for sale, and of which the package, yet unopened, was upon the table, but that he desired, previous to submitting the proposal to the Society, to communicate with Captain Cunningham.

The following coins were presented by the Sub-Secretary on the part of Captain Marriot, B. N. I.—2 coins of Mahmed Shah, Ben Nassir Shah, A. H. 627-634. 1 coin of Mahmed Toghluq, A. H. 725-752, both were in the Society's cabinet, and 2 Bactrian coins of Kadphises, and on the part of Lieutenant Sherwill, B. N. I., of the Behar Revenue Survey, two bags containing 134 old pice of various coinages.

Read the following letter in reply to the Society's application for Lieutenant Yule's report on the Cherra Poonjee coal, as noted in the Proceedings for October last :—

To H. TORRENS, Esq. *Vice President and Secretary, Asiatic Society.*

SIR,—Under Orders from Government, communicated in Secretary Lieutenant Colonel Stuart's letter No. 120, dated the 6th December last, I am directed by the Military Board to forward copy of Lieutenant Yule's report on the coal formations of Cherra Poonjee with Sections, &c.

J. GREEN,  
*Secretary.*

*Fort William, Military Board Office, 4th March, 1845.*

The Sub-Secretary stated that in relation to this valuable paper he would read the following extract from a letter of Lieutenant Yule's to his address of 22nd October last.

MY DEAR SIR,—The Sections and Report with the Military Board will be found quite useless for publication; they were the work of a young officer without any experience, just arrived in the country, and are almost confined to the account of different modes of conveying the coal to the plains. There is one point in them, which, however, should have met with attention, the coal which is found abundantly thrown up by the Panatcet river near Landour. From want of time, the lateness of the season, and being unable to procure jungle cutters I was unable to trace it to its bed, and was ordered off before I could return, but the coal is apparently first rate, and probably abundant. The river is the same that I have described in the last paragraph of the notes last sent.

*Kurnaul, October 22d, 1844.*

The paper and plans, which last were much admired, were handed to the Editors of the Journal:—

Read the following letter to the Society:—

*Monsieur TORRENS, Secrétaire de la Société Asiatique à Calcutta.*

MONSIEUR,—Madame de Storr a l'intention de publier, a la fin de chaque mois une livraison de quatre costumes lithographiés and coloriés, des différent peuples que l'on rencontre à Calcutta; Je desire beaucoup, en regard de chaque costume, faire paraître une notice indicative des mœurs et habitudes de celui qui le porte. Mais étant depuis trop peu de tems dans le pays, je n'ai pas acquis assez de connaissances pour decrire avec vérité des coutumes dont je n'ai entendu parler que vaguement.

La Société Asiatique possède entre autres sur l'Inde, un ouvrage en 4 volumes intitulé *Les Indous ou description des Mœurs et ceremonies*, &c. et un autre en deux volumes ayant pour titre l'*Inde Française*.

Je pourrais dans les deux ouvrages trouver des renseignemens propres a completer celle que je me propose de publier; et en vous priant, Monsieur, de vouloir bien en faire pour moi la demande au conseil, j'ose vous assurer qu'ils seront soignés comme choses extrêmement précieuses et que j'aurais a cur de justifier la confiance qu'il aura bien voulu m'accorder.

Je vous devrai aussi des remerciemens que je vous prie d'accueillir, ainsi que l'assurance de la tres haute consideration de

Votre tres humble et obeissant Serviteur,

A. B. DE STORR.

*Calcutta, 21st Feb. 1845.*

The Secretary stated that he had allowed M. De Storr to have from the library one volume at a time of each of the works applied for, as he deemed it incumbent on the Society to give every aid in its power to works of the kind proposed.

Read a note from E. B. Ryan, Esq. presenting to the Society a box of models of Ceylon boats, which were greatly admired for their beauty and fidelity.

The Secretary presented on the part of E. C. Ravenshaw, Esq. a memoir "On the ancient bed of the River Soane, and the site of Palibothra" with a map. This valuable paper was handed to the Editors of the Journal for early publication.

Read the following letter from Major R. Leech, B. N. I.

*To the Secretary to the Asiatic Society, Calcutta.*

MY DEAR SIR,—I shall be glad to hear whether the Society feel an interest in the subject of this letter.

I have taken advantage of my having been last year in charge of the Keythul and Umbalah districts to have compiled a map of the *Kurukhetra*, the scene of the Mahábhárata, as well as an accompanying account to illustrate the map from that work, from another called the *Kurukhetra Mahatma*, and from existing legends collected at each spot from the eldest and most intelligent inhabitants.

I should be glad to know what aid the Society is disposed to afford me in publishing both, or the map alone, which is on a scale of two miles to the inch.

R. LEECH, 1st Ast. G. G. A. N. W. F.

*Umbalah, New Frontier, 14th February, 1845.*

The Secretary stated that he had written to Major Leech to say that the Society would be most happy to publish the work in question for him in its Journal or Transactions, being a subject of the highest Indian Classical interest.

Read the following extract from a letter by Lieutenant Baird Smith, to the Sub-Secretary :

I intend shortly sending you a few coins obtained from the old village or town discovered on the Muskurra River. These have been obtained without charge to the Society. The site of the town has hitherto been covered with large quantities of boulders for the use of the canal work, so I have not been able as yet to make any farther search, but as these are now, or soon will be cleared away, I hope to pick up something more.

Read a letter from G. Buist, Esq. in charge of the Bombay Observatory, intimating that he had dispatched on the ship *Sterlingshire*, a set of the Observatory Records for 1843, to replace those formerly sent which had been damaged by oil in the *dawk bangy* transit.



## MUSEUM ECONOMIC GEOLOGY.

REPORT OF THE CURATOR OF THE MINERALOGICAL AND GEOLOGICAL DEPARTMENT,  
FOR THE MONTH OF FEBRUARY.

*Mineralogical and Geological.*

We have received from Major Crommelin, B. E., residing at Darjeeling, a small collection of 24 specimens of the rocks found by him on a tour in the neighbourhood of that station; he says:—

“The specimens are not so large as might be desired; the reason is that I proceed generally alone on my excursions, and find it no small addition to the fatigue of ascending 5000 or 6000 feet, to carrying a pocket load of stones.

*Darjeeling, January 21st, 1845.*

From Captain Munro, Her Majesty's 39th Regt. we have received two very pretty specimens of Ribbon Jasper from the neighbourhood of Gwalior, and a specimen of Limestone with fossil remains (shells) from the Hungrung pass in the Himalaya, at 16,000 feet.

Amongst the catalogues of collections which I have sedulously collected from every corner since my connection with the Museum, I found one, at least three years ago, of a collection of specimens by Dr. Jameson from the hills; but the specimens were no where to be found. I wrote to him on the subject, as also, through Mr. Torrens to Mr. George Clark at Umballah, but the collection appeared to be lost. To our great surprise it has re-appeared as will be seen by the following letters:—

To H. TORRENS, Esq. *Secretary, Asiatic Society, Calcutta.*

SIR,—When examining some wrecked property in my godown, the enclosed letter to your address was found, together with a quantity of stones, which I beg leave to forward to you.

*Calcutta, 26th February, 1845.*

J. HOLMES,  
*Secretary, Union Insurance\**

H. TORRENS, Esq. *Secretary, Asiatic Society.*

DEAR SIR,—As Mr. Clarke was sending some boxes to you, I have taken the opportunity of transmitting a few Geological specimens, collected during my tours in the hills, and which I beg you will have the goodness to lay before the Society, as they are intended to illustrate what I have written in your journal.

*Umballah, 4th October, 1844.*

WM. JAMESON.

The stones also have so far escaped injury that we have the full number of specimens. But the numbers, and consequently references, to about two thirds of them have been lost, being on paper labels only.\* Dr. Jameson, however, can easily renew them from his Catalogue which is descriptive and I have written to him to request the favour of his doing so for us.

From our indefatigable contributor Captain J. T. Newbold, M. N. I. we have to announce another curious and valuable paper “On the Alpine glacier, Iceberg

\* All specimens should be ink (and if possible paint) marked, with a number in India-where damp or insects destroy paper forthwith, and a duplicate copy of the catalogue should be made at the earliest possible moment.



Dilmiat and were transition theories with reference to the deposits of Southern India, its furrowed and striated rocks and rock basins," which to form a valuable addition to our knowledge on these heads, touching which so little is yet known out of Europe.

In consequence of our application to Government, at the suggestion of Colonel Forbes for copies of Lieutenant Yule's memoir and plans relative to the carriage of coal in the Kassia Hills, copies of them have been sent to us from the Military Board and will be valuable as records in this department.

For all the foregoing communications and presentations the best thanks of the Society were accorded.



*Oriental Publications for Sale, at REDUCED prices, by the Asiatic Society.*


WORKS.	Rs.	Former Price.
Mahábhárata, vol. 1st, pages 831, vol. 2d, pages 868, vol. 3d, pages 859, vol. 4th, pages 1007, royal 4to. ... ..	40	48
Large paper do. do. ... ..	50	61
Index to the 4 vols. of the Mahabharut complete. ... ..	6	0
Harriwansa, 563 pages, royal 4to. ... ..	5	6
Rája Tarangini, 440 pages, 4to. ... ..	5	20
Large paper, do. do. ... ..	8	12
Naishada, 917 pages, 8vo. ... ..	6	6
Sausruta, 1st vol. 378 pages, 2d vol. 562 pages, 8vo. ... ..	8	8
Fátawé A'lemgíri, 1st vol. 763 pages, 2d vol. 759 pages, 3d vol. 565 pages, 4th vol. 759 pages, 5th vol. 697 pages, 6th vol. 667 pages, royal 4to., per vol. ... ..	8	10
Ináya, 2d vol. 690 pages, 3rd vol. 682 pages, 4th vol. 937 pages, 4to. ... ..	8	10
Kházánat ul Ilm, 694 pages, 4to. ... ..	8	10
Jawáme ul Ilm ul Riázi, 168 pages, with 17 plates, 4to. ... ..	4	4
Anis ul Musharrahin, 541 pages, 4to. ... ..	5	5
Sharaya-ool-Islam, 631 pages, 4to. ... ..	8	15
Tibetan Grammar, 256 pages, 4to. ... ..	8	8
Tibetan Dictionary, 373 pages. 4to. ... ..	10	12
Asiatic Researches, per vol. ... ..	10	12
Burnouf Memoire sur deux inscriptions cunéiformes, 4to. 199 pp. ... ..	3	0
Burnouf Commentaire sur le Yacna, with notes &c. 2 parts, pp 945. ... ..	10	0

Rs. As.

Burnouf et Lassen, Essai sur le Pali, ou Langue Sacrée de la presquîle au de lá du Gange. Paris, 1826, pages 222, 8vo. ... ..	3	0
Elémens de la Grammaire Japonaise, par M. M. Rodriguez et Remusat. Paris, 1825, pages 158, 8vo. ... ..	3	0
Ditto ditto Supplément. Paris, 1826, pages 31, 8vo. ... ..	...	...
Contes Arabes, traduits par J. J. Marcel. Paris, 1835, avec notes, vol. I. pages 484, vol. II. pages 496, vol. III. pages 508, 8vo. ... ..	3	0
Brosset, Elémens de la Langue Georgienne. Paris 1837, pages 122, 8vo. ... ..	5	0
Klaproth, Vocabulaire et Grammaire de la langue Georgienne. Paris, 1827, pages 232, 1st part, 8vo. ... ..	4	0
Cronique Georgienne, traduite par M. Brosset, Text and Translation, Paris, 1830, pages 370, 8vo. ... ..	3	0
Choix de Fables de Vartan, en Arménien et en Français. Paris, 1825, pages 96, 8vo. ... ..	1	8
Elegie sur La Prisc D'Edesse, en Arménien. Paris 1828, pages 112, 8vo. ... ..	2	0
Chrestomathie Chinoise—Chinese Characters, 1833, pages 183, 4to. ... ..	5	0
Meng-Tseu, texte Chinoise, pages 161v, 8o. ... ..	3	0

*Oriental Publications for Sale, at REDUCED prices, by the Asiatic Society—(Continued.)*

	Rs.	As.
Meng-Tseu, traduction Latine, par S. Julien. Lutetiæ Parisiorum, 1824, pages 593, 8vo. ... ..	...	6 0
Lassen, Institutiones Linguæ Præciticæ. Bonnæ ad Rhenum, 1837, pages 167, 8vo. ... ..	...	6 0
Lassen, Anthologia Sanscritica. Bonnæ, 1838, pages 371, 8vo. ... ..	...	4 0
Lassen, Gita Govinda, Sanscrit et Latine. Bonnæ ad Rhenum, 1836, pages 180, 4to. ... ..	...	2 8
Chezy, Yajnadattabada, ou La Mort D'yadjnadatta, Text, Analysis and Translation. Paris, 1826, pages 142, 4to. ... ..	...	3 8
Chezy, La reconnaissance de Sacountala, Text and Translation. Paris, 1830, pages 665, 4to. ... ..	...	10 0
Geographie D'Aboulfêda, Texte Arabe. Paris, 1837-40, pages 586, 4to. ... ..	...	8 0
The Travels of Ibn Batuta, translated from the Arabic Manuscript, by S. Lea. London 1829, 143 pages, 4to. ... ..	...	6 0
The Travels of Macarius, translated by F. C. Belfour. London, 1829, pt. I. 114 pages, 4to. ... ..	...	4 0
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